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Earnings Quality and Ownership Structure: The Role of Private Equity Sponsors

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ABSTRACT: This study explores how firms' ownership structures affect their earnings quality and long-term performance. Focusing on a unique sample of private firms for which there is financial data available in the years before and after their initial public offering (IPO), I differentiate between those that have private equity sponsorship (PE-backed firms) and those that do not (non-PE-backed firms). The findings indicate that PE-backed firms generally have higher earnings quality than those that do not have PE sponsorship, engage less in earnings management, and report more conservatively both before and after the IPO. Further, PE-backed firms that are majority-owned by PE sponsors exhibit superior long-term stock price performance after they go public. These results stem from the professional ownership, tighter monitoring, and reputational considerations exhibited by PE sponsors.

Keywords: *conservatism; earnings management; private and public firms; private equity sponsors.*

Data Availability: *Data are available from sources identified in the text.*

This paper is based on my dissertation at Columbia University, which won the 2007 AAA Competitive Manuscript Award as well as the 2007 AAA Financial Accounting and Reporting Section Best Dissertation Award. I thank my committee members—Andrew Ang, Daniel Cohen, Bjorn Jorgensen (sponsor), Doron Nissim, and Stephen Penman (chair)—for their guidance and support. I also thank the following for their helpful comments: Nerissa Brown, Fabrizio Ferri, Dan Givoly, Carla Hayn, Paul Healy, Yael Hochberg, Steven Kachelmeier (editor), Michael Kimbrough, Gregory Miller, Partha Mohanram, Edward Riedl, Joseph Weber, Yuan Zhang, two anonymous reviewers, and the participants in workshops at the U.S. Securities and Exchange Commission, the 2006 AAA Annual Meeting, Columbia University, Duke University, the EAA 2007 Annual Congress, Harvard University, Massachusetts Institute of Technology, NBER-New World of Private Equity Conference, Northwestern University, The Pennsylvania State University, University of California, Berkeley, University of California, Los Angeles, University of Chicago, University of Michigan, University of Notre Dame, and Yale University. I thank Joseph Marren, my former colleague at the M&A department of Citigroup Investment Banking, for his insightful feedback. I also thank my wife, Elissa Swift Katz, for her support during the process. I gratefully acknowledge financial support from Columbia Business School, the Deloitte Doctoral Fellowship, and Harvard Business School. All errors are mine.

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I. INTRODUCTION

Although 99 percent of the companies operating in the United States are private (AICPA 2004), their accounting practices remain largely unknown due mainly to the lack of publicly available financial statements. In this study, I use a unique database of firms with privately held equity and publicly held debt to examine how two different ownership structures—private equity sponsorship and non-private equity sponsorship—affect firms' financial reporting practices, financial performance, and stock returns in the years preceding and following the IPO.[1]

Firms with private equity (PE) sponsors are owned and operated by investment houses such as the Blackstone Group and Kohlberg Kravis Roberts & Co., which generally buy mature businesses via leveraged buyout (LBO) or management buyout (MBO) transactions and take them private. PE sponsors have been involved in more than one-third of the IPOs and more than one-quarter of the U.S. mergers over the past few years. The value of private equity buyouts in the United States surged to $220 billion in 2006, and $438 billion in private-equity deals were announced in 2007. The rapid growth and increasing globalization of the PE industry has raised demands for increased regulation and disclosure within the sector due to concerns regarding anticompetitive behavior, excessive tax benefits, and stock manipulation.[2]

Despite their economic importance and the management expertise they bring, little is known about the role PE sponsors play in their portfolio companies' accounting practices. Most prior research has focused on venture capital (VC) firms rather than PE sponsors. While findings about VC firms yield valuable (albeit mixed) insights into how ownership structure affects accounting practices, such findings cannot be generalized to PE-sponsored firms owing to significant institutional differences between VC firms and PE sponsors, as discussed in Section II.

In this study, I examine how the trade-off between PE sponsors' alleged opportunistic behavior (Degeorge and Zeckhauser 1993), on the one hand, and their tighter monitoring and reputational considerations (e.g., Cao and Lerner 2007), on the other, affect earnings management, conservatism, and post-IPO performance compared to non-PE-backed firms that are owned and controlled by their management teams. In order to obtain data on these privately held firms, I use a unique sample of 147 IPOs (1,070 firm-year observations) that occurred between 1980 and 2005, for which a longer time-series of pre-IPO financial statements is available than in a typical prospectus.

Regarding earnings management in the five years before and after being taken public, I find that PE-backed firms engage in significantly less upward earnings management than non-PE-backed firms both pre- and post-IPO, consistent with tighter monitoring by, and the reputational considerations of, PE sponsors. In terms of timeliness of loss recognition, PE-backed firms recognize losses in a timelier manner than non-PE-backed firms, especially in the pre-IPO period. This pattern is consistent with the greater demand for timely information these firms face from both PE sponsor-owners and debt holders. This finding might further reflect the fact that PE sponsors can better anticipate and prepare their portfolio firms for future IPOs (Gompers 1995; Kaplan and Strömberg 2003), and thus report more conservatively in deference to public investors' anticipated demands.

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[1] Only scant data are available on privately held firms in the United States, with the exception of firms in regulated industries such as financial and insurance companies (Beatty and Harris 1999; Beatty et al. 2002; Mikhail 1999). Private firms with public debt are nevertheless subject to the same financial reporting regulations as public firms under Sections 13 and 15(d) of the Securities Exchange Act of 1934.

[2] PE-backed IPOs (also known as reverse-LBOs) have been the subject of particular scrutiny. See *Investment Dealers' Digest*, February 23, 2006; *Wall Street Journal*, October 10, 2006 and January 29, 2007; Economist.com, February 8, 2007; *BusinessWeek*, April 26, 2007; *Associated Press*, July 11, 2007; *Forbes*, December 10, 2007; and *USA Today*, January 29, 2008.

Post-IPO long-term financial and stock-price performance are also found to be associated with firms' ownership structure and PE sponsor size. Firms with majority ownership by a PE sponsor experience better long-term stock price performance; firms where the PE sponsor has a minority ownership have worse long-term financial and stock price performance than management-owned firms. Moreover, firms run by larger PE sponsors with greater capital under management (as a reputation proxy) exhibit better long-term financial and stock price performance when the firms go public. These findings are consistent with tighter monitoring by larger PE sponsors with higher ownership stakes.

This research contributes to the literature in several ways. First, the study furthers our understanding of how ownership concentration and structure affect financial reporting practices (e.g., Haw et al. 2004; Leuz et al. 2003; Leuz 2006; among others). Its focus on the role of PE sponsors sheds light on these unique owners who, although involved in a significant number of deals, have received little academic attention due to the lack of publicly available pre-IPO financial statements. Second, this research contributes to the literature on earnings management in the context of IPOs in general (e.g., Aharony et al. 1993; Teoh et al. 1998a; Teoh, Wong, and Rao 1998) as well as IPOs backed by private equity sponsors and VCs (Chou et al. 2006; Hochberg 2008; Morsfield and Tan 2006; Wongsunwai 2008). Third, this research is based on what is likely more accurate data. Prior studies have relied heavily on prospectus filings, which have been shown to be contaminated by optimistic bias, window dressing, and earnings manipulation (Ang and Brau 2002).[3] Ball and Shivakumar (2008) raise the additional concern that IPO proceeds in the year of IPO could inflate typical measures of earnings management. Fourth, this study adds to the growing literature on the post-IPO performance of U.S. PE-backed firms. Thus far, research has focused on the market performance of reverse-LBOs as compared to "ordinary" IPOs (Cao and Lerner 2007; Degeorge and Zeckhauser 1993; Holthausen and Larcker 1996), finding better long-term performance by reverse-LBO firms. Yet differences beyond ownership structure can affect these findings. For example, reverse-LBOs are mature firms that *return* to the public market, whereas ordinary IPOs typically involve much younger "growth" firms without a financial reporting history. Because both the PE-backed and non-PE-backed firms in my sample are mature firms, any age-related confounding effects are eliminated.

Finally, because my unique sample enables me to investigate private firms beyond those that are regulated (and thus have publicly disclosed financial statements), I can offer further insight into the reporting practices of such firms in a variety of industries and under different ownership structures. Overall, my findings on the effect of ownership structure are important to stakeholders such as investors, creditors, customers, employees, and suppliers that invest in, interact with, and depend on the financial health of private firms.

The study proceeds as follows. In Section II, the motivation for and theory underlying the hypotheses are presented. Section III contains a description of the data collection procedures and research design. Section IV provides a description of the sample. The results are presented in Section V and a variety of robustness tests are contained in the following section. Concluding remarks are offered in the last section.

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[3] According to paragraph 29 of the Accounting Principles Board Opinion No. 20, companies filing publicly for the first time are permitted restatements.

II. MOTIVATION, THEORY, AND HYPOTHESES

Private Equity Sponsors

The focus of this study is on the role of PE sponsors in determining financial reporting practices as distinct from the role of another type of private investor, VC firms. The evidence to date on how VC ownership affects earnings quality is limited and mixed. Several studies document *less* upward earnings management by VC-backed IPOs (as measured by lower discretionary accruals) than is observed in non-VC-backed IPOs (Hochberg 2008; Morsfield and Tan 2006). Wongsunwai (2008) further finds that post-IPO firms with higher-quality VCs have lower discretionary accruals and exhibit less likelihood of financial restatements. Other studies, however, document lower earnings quality in the presence of VCs. Cohen and Langberg (2008) document that reported accounting earnings are less informative for VC-backed firms than for non-VC-backed firms, and Darrough and Rangan (2005) find that some VCs' share sales in the year of the IPO are negatively associated with R&D spending changes, consistent with their incentive to increase reported earnings.

Note that there are important institutional differences between VC-backed and PE-backed IPOs that make it difficult to extend the VC-related findings to PE-backed firms. For example, unlike VCs, which invest in early-stage and mostly not-yet-profitable companies, PE sponsors generally buy mature, profitable businesses that had been subject to full financial disclosure before the IPO. The resulting lower information asymmetry between issuer and investors (Cai 2002) limits opportunities for PE sponsors to manage earnings prior to the IPO.[4] On the other hand, PE sponsors hold their portfolio firms via LBO funds that have a limited life span of 10–12 years, and usually share about 20 percent of the upside gain via carried interest (in addition to management fees of about 2 percent of the assets under management). Hence, PE sponsors have a strong incentive not only to file for an IPO before the funds mature, but also to manage reported earnings upward in order to maximize profits (Cao 2008).[5]

The only U.S. study of which I am aware that addresses how PE sponsorship affects accounting practices is Chou et al. (2006), who document significant upward earnings management (positive discretionary accruals) in the year of an IPO for PE-backed firms. However, due to sample limitations, the authors cannot conclude that PE sponsors' involvement in upward earnings management is greater than that of management-owners. This result (although statistically insignificant) is nevertheless surprising in light of the finding of less upward earnings management on the part of VC IPOs reported above. Whether ownership status influences pre-IPO earnings management thus remains an empirical question. Because I examine PE-backed firms with a more complete and standardized set of financial information before the IPO, I am able to more conclusively address the accounting reporting differences between PE-backed and non-PE-backed firms.

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[4] Although information asymmetry might be lower in my sample firms, earnings management might occur more than for "ordinary" IPOs and VC-backed firms, since these latter firms have little or no earnings history and thus no significant earnings to manage (Chou et al. 2006).

[5] Other differences exist between PE sponsors and VCs. For example, in contrast to VC-backed firms, firms with PE sponsors tend to have larger enterprise value and use significantly more bank debt. Also, PE sponsors generally hold a majority stake and assume control of the board of directors, whereas VC sponsors generally acquire only a minority stake. Further, PE managers typically come from a financial or management consulting background and their compensation is more highly sensitive to value creation. In contrast, VC managers are often successful start-up entrepreneurs or possess specialized technology expertise (Fraser-Sampson 2007; Hand 2005; Klein and Zur 2007; Sahlman 1990; Wright and Robbie 1998). Because of this difference in backgrounds, PE sponsors are less likely than VCs to assume operational control. Further, profit levels are crucial and technology considerations largely irrelevant for PE-backed firms, whereas the converse is true for VC-backed firms.

Earnings Management

The evidence to date on how ownership structure (PE-backed versus non-PE-backed) affects earnings management is limited and mixed. On one hand, theory and empirical evidence support the prediction that the active monitoring associated with the presence of PE sponsors *inhibits* earnings management. PE sponsors can actively monitor and motivate management by virtue of their board membership (Cotter and Peck 2001; Gompers 1995; Lerner 1995; Renneboog and Simons 2005). Tighter monitoring, more sophisticated ownership, and board membership are, in turn, expected to be associated with less earnings management (e.g., Cornett et al. 2006; Wongsunwai 2008; Xie et al. 2003). The separation of management and control enhances PE sponsors' monitoring role relative to that in non-PE-backed firms that are both owned and controlled by management teams. Hence, non-PE-backed firms might be expected to exhibit greater earnings management than firms with PE sponsors. Further, because PE sponsors are "repeat players" in the LBO debt as well as IPO market, PE sponsors risk reputation loss if their LBOs or IPOs fail (Cao and Lerner 2007; Cotter and Peck 2001), which also suggests that PE-backed firms will have less upward earnings management.

On the other hand, theory and empirical evidence support *greater* earnings management by PE-backed than by non-PE-backed firms, especially in the period surrounding an IPO. First, Degeorge and Zeckhauser (1993) suggest that PE-backed firms' decision to return to public listing is driven by opportunistic behavior and IPO timing. If PE-backed firms indeed go public because they have exhausted the benefits of the LBO ownership form or their profits are insufficient to cover their debt load, then one would expect them to manage earnings upward to a greater extent than non-PE-backed firms. Second, managers who feel more compelled to meet the earnings goals of the sophisticated PE sponsors for whom they work might, at least in principle, have greater motivation to manage earnings (Cornett et al. 2006). Finally, prior literature also documents that differences in firms' ownership concentration can affect reporting incentives and earnings management. Because in a more concentrated ownership structure, large owners typically sit on the board and are often directly involved in firm management, communicating firm performance via financial statements (and thus earnings management) becomes less important (Leuz 2006). Given that firms that are majority owned by PE sponsors have higher ownership concentration than firms that are owned by management, I further expect them to have a greater propensity to manage earnings (Haw et al. 2004; Leuz et al. 2003; Yeo et al. 2002).

Given the foregoing discussion, the first hypothesis (stated in alternative form), consistent with the monitoring role of PE sponsors, is:

H1: Non-PE-backed firms engage in upward earnings management to a greater extent than do PE-backed firms.

Timely Loss Recognition (Conservatism)

Prior literature identifies timely loss recognition as an important attribute of financial reporting quality (e.g., Ball and Shivakumar 2005; Basu 1997; Givoly, Hayn, and Natarajan 2007). One would expect PE-backed firms to have *more* timely loss recognition than non-PE-backed firms because they face greater demand for timely information. Consistent with this, Ball and Shivakumar (2008) document that U.K. private firms begin to report more conservatively a few years before public listing in anticipation of expected post-IPO demands of public investors and the public market enforcement mechanism. Because PE sponsors can better anticipate and prepare their portfolio firms for future IPOs (Gompers

1995; Kaplan and Strömberg 2003), I expect PE-backed firms to report more conservatively in the pre-IPO period than non-PE-backed firms that cannot as easily anticipate the exit. Another consideration is that debt levels tend to be significantly higher for PE-backed than for non-PE-backed private firms. Debt holders tend to demand more timely loss recognition (Ball et al. 2008). Finally, Kaplan and Strömberg (2003) show that PE sponsors make control rights contingent on financial as well as nonfinancial measures. This might be associated with greater financial reporting discipline than is observed for management-owned firms and, hence, increased demand for higher quality accounting information.

Alternative theory and empirical evidence support *less* timely loss recognition by PE-backed firms. Due to their higher ownership concentration, PE sponsor-owners can more easily resolve any information asymmetry through "insider access" and thus have less need to rely on public disclosure. They thus have less incentive to incorporate economic losses into accounting income in a timely manner (for a discussion of "insider access," see Ball et al. [2000] and Francis et al. [2005]). Support for less timely loss recognition is also present in the VC literature; Cohen and Langberg (2008) find that reported earnings are less informative for VC-backed firms and that the value of, and information within, reported earnings decrease as a function of VC ownership.

Consistent with the financial reporting discipline created by PE sponsors, the next hypothesis (stated in alternative form) is:

> **H2:** PE-backed firms are more likely than non-PE-backed firms to recognize losses in a timely fashion.

Post-IPO Abnormal Returns and Financial Performance

The next issue I address is whether ownership structure affects long-term reported financial performance and market returns in the post-IPO period. As hypothesized above, to the extent that PE-backed firms have lower pre-IPO discretionary accruals than non-PE-backed firms, reported earnings in the post-IPO years as well as overall reported financial performance are expected to reverse and deteriorate to a lesser degree (Teoh, Wong, and Rao 1998). This better earnings quality is also predicted to lead to relatively higher stock returns (Chou et al. 2006). Furthermore, in addition to giving financial and strategic advice, PE sponsors play a monitoring role in their portfolio firms (Gompers 1995; Lerner 1995), and tighter monitoring has been found to be associated with better earnings quality (Wongsunwai 2008), long-term financial performance (Ivanov et al. 2008), and stock returns (Cao and Lerner 2007).

As discussed above, the counter-argument to higher earnings quality is that PE-backed firms might opt to go public as a result of opportunistic behavior and IPO timing. If PE-backed firms go public because they have exhausted the benefits of the private ownership form or their profits are insufficient to cover their debt load, then their operating performance following the IPO would be expected to deteriorate to a greater extent than that of non-PE-backed firms (Degeorge and Zeckhauser 1993). Relatedly, improvements in the financial performance of PE-backed firms that go private can also be explained by agency theory, in particular, greater goal congruence between owners and management, stronger incentives to create shareholder wealth as management's ownership stake increases, and the disciplinary role of higher leverage (Bruton et al. 2002; Holthausen and Larcker 1996; Kaplan 1991). When a company returns to public listing, manager and owner interests and incentives once again diverge, monitoring costs increase, leverage decreases, and agency theory, as noted above, predicts a reintroduction of inefficiencies and loss of previously experienced performance gains (Bruton et al. 2002). Finally, other factors such as managerial risk aversion or managerial entrenchment might lead to performance *increases* following a reverse buyout of *management*-owned as opposed to PE-backed firms (Holthausen and Larcker 1996).

Consistent with the higher earnings quality and better monitoring and control associated with PE sponsor owners, the next hypothesis (stated in alternative form) is:

> **H3:** PE-backed firms are likely to have better long-term financial and stock price performance in the post-IPO period than non-PE-backed firms.

III. SAMPLE SELECTION AND RESEARCH DESIGN

Sample Selection

My sample consists of private firms that have public debt. Because their debt is public, even though they are privately held, these companies have to make their financial statements publicly available. I select all firm-year observations on Compustat in any of the 28 years from 1978 through 2005 that satisfy the following criteria: (1) the firm's stock price at fiscal year-end is unavailable, (2) the firm has total debt as well as total annual revenue exceeding $1 million, (3) the firm is a domestic company, (4) the firm is not a subsidiary of another public firm and, (5) the firm is not a financial institution or in a regulated industry (SIC codes 6000–6999 and 4800–4900).

To ensure that my sample includes only private firms with public debt, I examine each firm and remove public firm observations (details are provided in Table 1).[6] I further categorize each firm as being in one of the following pre-IPO, mutually exclusive categories, (1) PE majority-owned, defined as firms that are majority-owned (more than 50 percent) by PE sponsors, (2) PE minority-owned, defined as firms that are minority-owned (equal to or less than 50 percent) by PE sponsors, and (3) management-owned, defined as firms that do not have a PE sponsor and are at least 50 percent owned by the founders, executives, directors, or family members. The resulting sample consists of 2,412 firm-year observations and 508 private firms.

To focus on the period surrounding the IPO, defined as five years before and five years after, I further remove all non-IPO firms. The final sample consists of 147 IPO firms, 123 PE-backed (both majority- and minority-owned) IPOs, and 24 management-owned IPOs (hereafter, referred to as non-PE-backed, or management-owned, firms).

The Corporate New Issues database of Securities Data Company (SDC) was used to identify the IPO date and first day of trading. Return data was derived from CRSP. For firms in the pre-IPO phase, corporate governance information was collected from 10-Ks and proxies in the year prior to the IPO. Prospectus information was used to identify changes in corporate governance post-IPO. The Thomson Financials VentureXpert database provided information on the PE sponsors.

Research Design: Earnings Management

Detecting Earnings Management

To be able to compare my findings with those of prior research, I identify earnings management cases using the cross-sectional modified Jones (1991) approach, which models

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[6] Because some public firms met the above criteria as a result of missing price data, to further determine whether firms qualified as private firms with public debt I hand-collected SEC filings information from EDGAR and 10K Wizard, bankruptcy information from BankruptcyData.com, and other historical information from Hoover's DataBase as well as from several news resources including Factiva, ProQuest, and Lexis-Nexis.

TABLE 1
Sample Selection

Private Firms with Public Debt (1980–2005)	No. of Firm-Year Observations	No. of Firms
"Potential" private firms with public debt (Compustat)[a]	13,062	3,355
Eliminate firms that:		
Do not have historical prospectus data[b]	(3,233)	(1,242)
Are public firms	(2,324)	(371)
Are subsidiaries of public firms	(561)	(102)
Are public spin-offs	(111)	(34)
Are involved in bankruptcy proceedings	(295)	(100)
Have insufficient information	(1,683)	(344)
Are foreign firms	(772)	(184)
Other[c]	(918)	(396)
Subtotal of private firms with public debt	3,165	582
Eliminate firms that:		
Are cooperatives, LPs, government- or employee-owned, and firms for which ownership structure cannot be ascertained	(753)	(74)
Private firms with public debt	2,412	508
Final sample of IPO firms[d]	1,070	147
Firms with private equity sponsors	884	123
Firms that do not have private equity sponsors	186	24

[a] The sample of "potential" private firms with public debt consists of all firm-year observations on Compustat in any year from 1978 to 2005 that satisfy the following criteria: (1) the firm's stock price at fiscal year-end is unavailable, (2) the firm has total debt as well as total revenues exceeding \$1 million, (3) the firm is a domestic company, (4) the firm is not a subsidiary of another public firm, and (5) the firm is not a financial institution or in a regulated industry (SIC codes 6000–6999 and 4800–4900).

[b] Compustat reports three years of historical information for public firms that file for initial public offering (IPO). This financial information is taken from the prospectus.

[c] "Other" includes observations of the same firm with different names, firms that do not have information for consecutive years, firms that have joint ventures and partnerships with public firms, holding companies of public firms, and observations with information available only for the years 1978–1979.

[d] Firms owned by PE sponsors or management and that filed for an IPO. There are as many as 11 firm-year observations for each of these firms (the IPO year and five years before and after the IPO).

total accruals as a function of change in sales (after subtracting the change in trade receivables) and level of property, plant, and equipment. The regression parameters are derived by estimating this model on all public firms with the same two-digit SIC code each year.[7]

Though widely used in the earnings management literature, accruals models such as the modified Jones model are far from perfect in detecting earnings management. One limitation is that the model assumes the relationship between cash flows and accruals to be linear, thus ignoring the asymmetry in the gain and loss recognition of accruals. To address this, I add a proxy for potentially reportable gains and losses in the form of the sign of the cash flows from operations (see Ball and Shivakumar 2006). Also, because firm performance might be a key driver of both the decision to go public and PE sponsors' provision of financial backing (Morsfield and Tan 2006), and to control for systematic differences in performance, I employ in an untabulated analysis the Kothari et al. (2005) performance-matching approach.[8]

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[7] To estimate the model yearly by two-digit SIC code, I require that at least 10 observations be available. The regression is: $TACC_{j,t}/TA_{j,t-1} = a_1{*}[1/TA_{j,t-1}] + a_2{*}[(\Delta REV_{j,t} - \Delta TR_{j,t})/TA_{j,t-1}] + a_3{*}[PPE_{j,t}/TA_{j,t-1}]$ where: *TACC* is total accruals for firm *j* in year *t*, which is defined as income before extraordinary items (#123) minus net cash flow from operating activities, adjusted to extraordinary items and discontinued operations (#308 − #124). For the years prior to 1988, *TACC* is defined as Δ(current assets #4) − Δ(current liabilities #5) − Δ(cash #1) + Δ(short-term debt #34) − (depreciation and amortization #125). To correct for measurement errors in the balance-sheet approach, I eliminate firm-year observations with "non-articulating" events (Hribar and Collins 2002). *TA* is the beginning-of-the-year total assets (lagged #6), Δ*REV* is the change in sales in year *t* (#12), *PPE* is gross property, plant, and equipment in year *t* (#7), and Δ*TR* is the change in trade receivables in year *t* (#151).

Additional Earnings Management Measure

To address changes that arise from external factors unrelated to earnings management, I differentiate between "real" performance (as indicated by free cash flow) and "managed" performance (as indicated by accruals). Following Penman and Zhang (2004), I model the operating activities as $Operating\ Income_{j,t} = Free\ Cash\ Flow_{j,t} + \Delta NOA_{j,t}$. *Free Cash Flow* is the "hard" and presumably unmanaged component of operating income, $\Delta NOA_{j,t}$, because it involves discretionary measurements and estimations, the "soft" and potentially managed aspect of operating income.[9] $\Delta NOA_{j,t}$ can therefore be used as an additional signal of earnings management, where growth in net operating assets is estimated as:

$$GNOA_{j,t} = (NOA_{j,t} - NOA_{j,t-1})/|NOA_{j,t-1}|. \tag{1}$$

Following prior literature (Teoh et al. 1998b), I report the differences between the *GNOA* measure for each firm and the median measure for the same year and industry.[10] To minimize survivorship bias, I use the average of five years' annual *UTACC* and *GNOA* variables, and the maximum number of years for which Compustat data is available for firms that do not survive for five full years after their IPOs (for further discussion, see Ivanov et al. [2008]).

Multivariate Earnings Management Analysis

To allow for differences in earnings management between PE-backed and non-PE-backed firms in testing H1, I also estimate the following regression:

$$\begin{aligned} EM_t = {} & a_0 + a_1{*}PE + a_3{*}Size_t + a_4{*}BV_t + a_5{*}Growth_t + a_6{*}Leverage_t \\ & + a_7{*}Profitability_t + a_8{*}QRatio_t + a_9{*}Oper\_Cycle_t \\ & + a_{10}{*}Age_t + a_{11}{*}Cash_t + a_{12}{*}CAPEX_t + a_{13}{*}D\_Loss_t \\ & + a_{14}{*}D\_Audit\_Quality_t + e_t \end{aligned} \tag{2}$$

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[8] In particular, I match each observation by industry, year, and the deciles of *ROA* in the same industry and year, where *ROA* is defined as net income (#172) + net of tax interest expense (#15), standardized by total assets at the beginning of the year (lagged #6).

[9] *NOA* is common equity (#60) + debt in current liabilities (#34) + total long-term debt (#9) + preferred stock (#130) − cash and short-term investments (#1) − investments and advances (#32) + minority interest (#38); *Operating Income* is net income (#172) + Δ(cumulative translation adjustment #230) + after-tax interest expense (#15) − after-tax interest income (#62) + minority interest in income (#49) (see Nissim and Penman 2003); Compustat variable numbers are shown in parentheses.

[10] In this and subsequent industry-based analyses, I require that there be at least five non-IPO firms present. I first consider all firms with the same four-digit SIC code; if there are fewer than five observations, I consider firms in the same three-digit SIC code; if there are still fewer than five non-IPO firms present, I consider firms with the same two-digit SIC codes.

where EM_t is a measure of earnings management, alternatively defined as $UTACC_t$ or $GNOA_t$, PE is a dummy variable with the value 1 for PE-backed private firms (both majority- and minority-owned) and 0 for firms owned by management, *Size* is alternatively defined as the natural logarithms of total assets (#6) or sales (#12), *BV* is equity book value (#60 + #130 + #35) divided by total assets, *Growth* is defined as growth in sales, *Leverage* is defined as total debt (#9 + #34) divided by total assets, *Profitability* is defined as operating income divided by net operating assets (*RNOA*), *QRatio* is the quick ratio, defined as cash and short-term investment (#1) plus total receivables (#2) divided by current liabilities (#5), *Oper_Cycle* is operating cycle days (receivable collection period plus inventory turnover in days), *Age* is defined as number of years since incorporation (first appearance on Compustat), *Cash* is cash and short-term investment divided by total assets. *CAPEX* is capital expenditures (#128) divided by total assets, *D_Loss* a dummy for loss firms (#172) and *D_Audit_Quality* a dummy for the big national accounting firms (#149).[11]

Research Design: Timely Loss Recognition

Earnings are more conservative when losses are recognized in a timely manner, as emphasized by Basu (1997), who uses stock returns as a proxy for economic gains and losses. Ball and Shivakumar (2005) and Beuselinck et al. (2008), in their examinations of private firms, use changes in accounting income to proxy for economic gains and losses. Following this approach, to test H2 I estimate the following regression, which allows for differences in timely loss recognition between PE-backed and non-PE-backed firms:

$$\begin{aligned}\Delta OpI_t = {} & a_0 + a_1{*}D\Delta OpI_{t-1} + a_2{*}\Delta OpI_{t-1} + a_3{*}D\Delta OpI_{t-1}{*}\Delta OpI_{t-1} \\ & + a_4{*}PE + a_5{*}PE{*}D\Delta OpI_{t-1} + a_6{*}PE{*}\Delta OpI_{t-1} \\ & + a_7{*}PE{*}D\Delta OpI_{t-1}{*}\Delta OpI_{t-1} + e_t \end{aligned} \tag{3}$$

where ΔOpI_t is the change in earnings from year $t-1$ to year t standardized by total assets at the end of year $t-1$ (earnings are measured before interest expense and interest income); $D\Delta OpI_{t-1}$ is a dummy variable set to 1 if $\Delta OpI_{t-1} < 0$, and 0 otherwise; and PE is a dummy variable with 1 indicating PE-backed firms and 0 indicating non-PE-backed firms.

Hypothesis 2 holds that the involvement of PE sponsors leads to a higher level of earnings quality, as measured by more timely loss recognition. Consistent with this, PE-backed firms are expected to exhibit less timely gain recognition than non-PE-backed firms, and thus gains are expected to be more persistent and tend not to reverse (i.e., $a_6 > 0$). Relatedly, PE-backed firms are expected to have more timely loss recognition than non-PE-backed firms, and therefore transitory losses are expected to be more likely to reverse over time (i.e., $a_7 < 0$).

To ensure that the timely loss recognition identified in Equation (3) is not a result of random errors in accruals or of earnings management, an alternate model proposed by Ball and Shivakumar (2005) that recognizes unrealized gains and losses via accruals is employed. Ball and Shivakumar (2005) maintain that there is an asymmetric positive correlation between accruals and contemporaneous cash flows because of the more timely recognition of economic losses than of economic gains. As a result, this positive correlation is greater in the case of losses. To control for this effect, I follow the variation of the Ball and Shivakumar (2005) approach used by Beuselinck et al. (2008):

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[11] The various control variables were used in prior research on IPOs, and the choice of private equity financing (Beuselinck et al. 2008; Chou et al. 2006; Morsfield and Tan 2006). Audit firm size is included because it might affect earnings quality (Aharony et al. 1993; Morsfield and Tan 2006).

$$\begin{aligned} ACC_t = {} & \mathrm{b}_0 + \mathrm{b}_1{*}DCFO_t + \mathrm{b}_2{*}CFO_t + \mathrm{b}_3{*}DCFO_t{*}CFO_t + \mathrm{b}_4{*}PE \\ & + \mathrm{b}_5{*}PE{*}DCFO_t + \mathrm{b}_6{*}PE{*}CFO_t + \mathrm{b}_7{*}PE{*}DCFO_t{*}CFO_t + \mathrm{e}_t \end{aligned} \tag{4}$$

where ACC_t is total accruals in year t, CFO_t is defined, for years after 1988, as cash from operations in year t adjusted for extraordinary items and discontinued operations (#308 − #124), and prior to 1988 as funds from operations (#110) − Δ(current assets #4) + Δ(cash and cash equivalent #1) + Δ(current liabilities #5) − Δ(short-term debt #34). All variables are standardized by total assets at end of year $t-1$. $DCFO_t$ is a dummy variable that takes the value 1 if $CFO_t < 0$, and 0 otherwise. *PE* is a dummy variable with 1 indicating PE-backed, and 0 indicating non-PE-backed firms.

I predict that the above model will demonstrate the strong role of accruals in mitigating noise in operating cash flow (i.e., $\mathrm{b}_2 < 0$). Further, in keeping with H2, PE sponsorship is expected to lead to more timely recognition of losses, which, in turn, is expected to result in a positive correlation between accruals and contemporaneous cash flow in negative-cash-flow years (i.e., $\mathrm{b}_7 > 0$).

To account for the possible endogeneity of receiving PE financing, I use Heckman's (1979) two-stage procedure. In the first stage, a PROBIT model is estimated with, as predictors, all explanatory variables included in Regression (2). Estimates of the PROBIT model are used to compute the inverse Mills' ratio for each sample firm. In the second stage, the inverse of the Mills' ratio serves as a control variable in Regressions (2), (3), and (4), and the coefficient is allowed to vary between the two groups of firms. (A similar approach is used in Ball and Shivakumar [2005], Beuselinck et al. [2008], Givoly, Hayn, and Katz [2007], and Hochberg [2008].)

Research Design: Stock Returns and Financial Performance

To measure subsequent stock returns, for each sample firm I compute the adjusted size and book-to-market matched returns calculated as the buy-and-hold daily returns for one year, three years, and five years after the IPO, less the buy-and-hold returns on a benchmark of a value-weighted size and book-to-market matched control sample over the same period.[12] If the sample firm is delisted during the relevant period, then I add the delist return to the firm's buy-and-hold return and set the size and book-to-market matched return equal to 0 after the delisting date. Missing delisting returns are allocated as suggested by Shumway and Warther (1999) and the Center for Research in Security Prices "white paper" on delisting returns (CRSP 2001).

To avoid having overlapping periods in the estimation of buy-and-hold returns, following Chou et al. (2006) and Fan (2007), I also estimate the value-weighted monthly abnormal returns based on calendar time using the Fama and French (1993) three-factor model. Specifically, I regress the monthly returns (in excess of the risk-free rate) on the three factors as in the following regression:

$$R_{pt} - R_{ft} = \mathrm{a_p} + \mathrm{b_p}(R_{mt} - R_{ft}) + \mathrm{s_p}SMB_t + \mathrm{h_p}HML_t + \varepsilon_t \tag{5}$$

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[12] The daily matched portfolio returns as well as the relevant breakpoints are from Kenneth French's website: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

where R_{pt} is the equally weighted portfolio returns in calendar month t, R_{ft} is the 30-day T-bill yield in month t, R_{mt} is the return on the value weighted CRSP index, SMB_t is the return on small firms minus the return on large firms, and HML_t is the return on high book-to-market stocks minus the return on low book-to-market stocks in month t. Equation (5) is estimated separately for each ownership stake and for different sizes of PE sponsors. Note that the estimate of the intercept coefficient (a_p) is a measure of average monthly abnormal returns, the variable of interest.

In addition to considering the sample firms' stock performance in the post-IPO years, I consider three measures of long-term financial performance computed, alternately, over a one-year, three-year, or five-year period following the IPO. The first measure is the average industry-adjusted return on assets (ROA). I report the differences between the ROA measure for each firm and the median measure for the same period and industry (see footnote 10 for the industry composition). The second measure is the market-to-book ratio at the end of each period. In calculating the above two measures, for firms that did not survive the entire period considered after the IPO (one, three, or five years), the maximum number of years for which data is available is used. The third measure, stock exchange delisting, is based on whether the sample firms continued to be publicly traded. This measure is calculated as the percentage of sample firms delisted from the NYSE, AMEX, or NASDAQ exchange due to bankruptcy, default, or liquidation (CRSP delisting codes 400 and above). (For similar implementations of these measures, see Field and Karpoff [2002], Gompers et al. [2003], Ivanov et al. [2008], and Moeller et al. [2004].)

IV. DESCRIPTIVE STATISTICS

Table 2 presents descriptive statistics for 123 PE-backed (96 majority-owned and 27 minority-owned) and 24 non-PE-backed (management-owned) firms that had IPOs. The table compares the two groups for two periods: five years before and five years following the IPO. Note that the number of firms in the post-IPO period is reduced (to 70 majority-owned and 23 minority-owned PE-backed firms and 21 management-owned firms) as a result of IPOs filed after the sample period (i.e., after the year 2005) and other organizational structure changes (such as mergers and bankruptcy filings).

Majority-owned, PE-sponsored private firms constitute 65 percent of the pre-IPO sample, minority-owned, PE-sponsored firms 18 percent, and management-owned firms 16 percent. PE-backed firms have significantly lower quick ratios and cash as a percentage of assets than non-PE-backed firms in both the pre- and post-IPO periods. PE-backed firms also have significantly higher leverage. For both PE-backed and non-PE-backed firms, leverage is significantly higher in the pre-IPO than in the post-IPO period.[13] These observations are not surprising inasmuch as PE sponsors tend to be involved in LBO and MBO activities that involve significant amounts of debt financing, especially in the pre-IPO periods. Another analysis (untabulated) indicates that the different ownership forms have a similar industry representation, although PE-backed firms tend to concentrate more in manufacturing (SIC codes 30–39), while non-PE-backed firms tend to concentrate more in service-related industries (SIC codes 70–89).

Because different ownership structures are likely to be manifested in stock holdings, board composition, and management compensation, Table 3 presents descriptive statistics

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[13] PE-backed firms also have a higher concentration of below-BBB-ranked debt in the pre-IPO period (72 percent and 46 percent for majority-owned and minority-owned PE-backed firms, respectively, versus 40 percent for management-owned firms). In the post-IPO period, the concentration is approximately 50 percent across the three ownership structures.

TABLE 2
Descriptive Statistics of Financial Variables in the Pre-IPO and Post-IPO Periods

		Five Years Pre-IPO						Five Years Post-IPO					
		PE[a] Majority (1)	PE Minority (2)	Mgmt (3)	Diff.[b] (1) − (2)	Diff. (1) − (3)	Diff. (2) − (3)	PE Majority (4)	PE Minority (5)	Mgmt (6)	Diff.[b] (4) − (5)	Diff. (4) − (6)	Diff. (5) − (6)
No. of Firms		96	27	24				70	23	21			
No. of Firm-Year Observations		329	85	86				254	93	76			
Total Assets (in $ millions)	Mean	849	814	1146	35	−296*	−331	1412	1228	1483	184	−71	−255
	Median	516	390	382	126***	134***	8	913	654	594	260***	319***	60
Total Sales (in $ millions)	Mean	974	979	963	−6	10	16	1886	1354	891	532**	996***	463**
	Median	540	533	504	7	36***	29	1127	782	661	345***	466***	121*
Sales Growth	Mean	6.9%	8.5%	7.6%	−1.6%	−0.7%	0.9%***	9.3%	8.2%	14.7%	1.0%	−5.4%	−6.5%
	Median	5.5%	4.6%	5.2%	0.9%***	0.3%***	−0.6%	7.5%	4.4%	9.1%	3.1%***	−1.6%***	−4.7%
Leverage	Mean	72.8%	76.5%	58.3%	−3.7%	14.5%***	18.2%***	47.7%	50.5%	42.2%	−2.8%	5.5%*	8.3%**
	Median	68.7%	71.0%	54.5%	−2.3%***	14.2%***	16.5%	45.0%	44.7%	44.8%	0.3%***	0.2%***	−0.1%
ROA	Mean	5.2%	3.4%	3.6%	1.9%	1.7%	−0.2%	5.2%	4.4%	5.1%	0.8%	0.2%	−0.7%
	Median	5.5%	5.4%	5.1%	0.1%***	0.4%***	0.3%	6.3%	5.5%	5.0%	0.8%***	1.3%***	0.6%
Q-Ratio	Mean	83.2%	70.3%	109.6%	13.0%**	−26.4%***	−39.3%***	81.3%	85.2%	105.1%	−3.9%	−23.8***	−19.9%*
	Median	75.1%	62.4%	102.9%	12.7%***	−27.8%***	−40.6%	73.9%	69.2%	91.4%	4.7%***	−17.5%***	−22.1%
Cash	Mean	3.9%	4.2%	5.8%	−0.4%	−2.0%**	−1.6%	4.5%	4.0%	7.9%	0.5%	−3.4%***	−3.9%***
	Median	2.1%	1.3%	2.4%	0.8%***	−0.3%***	−1.1%	1.7%	1.2%	3.2%	0.5%***	−1.5%***	−2.0%
TACC	Mean	−7.9%	−7.8%	−5.1%	−0.1%	−2.9%**	−2.7%*	−5.1%	−6.7%	−6.1%	1.6%**	0.9%	−0.6%
	Median	−6.9%	−7.1%	−5.2%	0.2%***	−1.7%***	−1.8%*	−4.7%	−6.2%	−5.9%	1.45***	1.2%***	−0.3%**
CFO	Mean	7.6%	5.1%	4.2%	2.5%	3.4%	0.9%	7.7%	9.6%	7.3%	−1.9%*	0.5%	2.3%*
	Median	6.8%	5.3%	5.7%	1.4%*	1.1%*	−0.4%	8.3%	8.2%	7.3%	0.1%***	1.0%***	0.8%**
% of Loss Firms	Mean	48.6%	57.6%	36.0%	−9.0%	12.6%	21.6%	22.8%	34.4%	27.6%	−11.6%**	−4.8%	6.8%
% Audited by a Big Auditor	Mean	96.0%	82.4%	93.0%	13.7%	3.0%	−10.7%	99.6%	93.5%	97.4%	6.1%**	2.2%	−3.8%

(*continued on next page*)

TABLE 2 (continued)

***, **, * Significance at the 0.01, 0.05, and 0.10 level, respectively.

Mean and median values of the variables over the five-year period are reported.

The distribution of each variable is Winsorized at the extreme ±1 percent values.

[a] Management ownership was based on the holdings of the founders, top executives, directors, and family members.

[b] Differences in means are tested for significance using a two-tailed t-test; differences in medians are tested for significance using a two-tailed Wilcoxon signed rank test.

Variable Definitions:

Total Assets = total end-of-the-year assets in millions of dollars (Compustat data item #6);
Total Sales = sales (net) in millions of dollars (#12);
Leverage = total debt (#9 + #34) divided by total assets at end of the year (#6);
Sales Growth = growth in sales (#12) from year $t-1$ to year t;
ROA = net income (#172) plus net of tax interest expense (#15) divided by total assets at end of year $t-1$ (lagged #6);
Q-Ratio = cash and short-term investment (#1) plus total receivables (#2) divided by current liabilities (#5);
Cash = cash and short-term investment (#1) divided by total assets at end of year t (#6);
TACC = total accruals divided by total assets at end of year $t-1$ (lagged #6); for year >= 1988: total accruals [income before extraordinary items (#123) − net cash flow from operating activities (#308) + extraordinary items and discounted operations (#124)] divided by total assets at end of year $t-1$ (lagged #6); for year < 1988: [change in current assets during period t (#4) − change in current liabilities during period t (#5) − change in cash and cash equivalents during period t (#1) + change in current maturities of long-term debt and other short-term debt included in current liabilities during period t (#34) − depreciation and amortization expense during period t (#125)]; in addition, firm-year observations with the following "non-articulating" events were removed: firm-year observations in which a company is involved in a merger or acquisition (#AFTNT35 code #1); firm-year observations in which a company reports "discontinued operations" greater than $10,000 (#66); and firm-year observations in which a company reports a gain or loss on foreign currency translations greater than $10,000 (#150);
CFO = cash flow from operations divided by total assets at the end of year $t-1$; for year >= 1988: net cash flow from operating activities (#308) divided by total assets at end of year $t-1$ (lagged #6); for year < 1988: [funds from operations (#110) − change in current assets during period t (#4) + change in cash and cash equivalent during period t (#1) + change in current liabilities during period t (#5) − change in current maturities of long-term debt and other short-term debt included in current liabilities during period t (#34)];
Loss Firms = firms with negative net income (#172) during year t; and
Audited by a Big Auditor = the percentage of firms audited by one of the big national auditing firms (#149).

TABLE 3
Descriptive Statistics on Ownership, Board Composition, and CEO Compensation in the Pre-IPO and Post-IPO Periods

		Pre-IPO						Post-IPO					
		PE Majority (1)	PE Minority (2)	Mgmt (3)	Diff.[a] (1) − (2)	Diff. (1) − (3)	Diff. (2) − (3)	PE Majority (4)	PE Minority (5)	Mgmt (6)	Diff. (4) − (5)	Diff. (4) − (6)	Diff. (5) − (6)
No. of Firms		62	12	18				62	12	18			
Ownership													
Owned by PE Sponsors	Mean	79.9%	36.4%		43.5%***			48.9%	20.8%		28.0%***		
	Median	82.8%	39.9%		42.9%***			50.1%	20.5%		29.6%***		
Owned by Management	Mean	12.9%	15.3%	57.0%	−2.5%	−44.2%***	−41.7%***	6.5%	12.5%	49.6%	−6.0%*	−43.0%***	−37.0%***
	Median	9.4%	13.1%	68.5%	−3.7%***	−59.1%*	−55.4%	4.6%	13.4%	51.6%	−8.8%***	−47.0%	−38.2%**
Owned by CEO	Mean	5.6%	14.9%	38.3%	−9.3%*	−32.7%***	−23.4%**	3.2%	6.2%	15.0%	−3.1%	−11.8%*	−8.8%
	Median	3.0%	11.2%	26.4%	−8.3%***	−23.5%**	−15.2%	1.9%	3.8%	8.0%	−1.9%***	−6.1%***	−4.2%
Board													
Chair is CEO	Mean	56.5%	83.3%	61.1%	−26.9%**	−4.7%	22.2%	54.8%	91.7%	61.1%	−36.8%***	−6.3%	30.6%**
Insiders	Mean	33.9%	29.9%	56.7%	4.0%	−22.7%***	−26.7%***	25.3%	27.6%	37.4%	−2.4%	−12.1%***	−9.8%**
	Median	29.3%	28.6%	50.0%	0.7%***	−20.7%***	−21.4%***	22.2%	28.6%	40.0%	−6.3%***	−17.8%***	−11.4%*
PE Sponsors on Board	Mean	55.2%	34.0%		21.1%***			50.3%	29.4%		20.9%***		
	Median	57.1%	37.5%		19.6%***			50.0%	31.0%		19.0%***		
Board Size	Mean	7.1	6.3	5.4	0.8**	1.7**	0.9	8.2	6.3	6.6	1.8***	1.5***	−0.3
	Median	7.0	6.0	5.0	1.0***	2.0***	1.0	8.0	7.0	6.5	1.0***	1.5***	0.5
CEO Compensation													
Options	Mean	68.4%	68.7%	13.2%	−0.2%	55.3%**	55.5%**	69.9%	65.7%	46.9%	4.2%	23.0%*	18.8%
(% of total compensation & options)	Median	71.0%	68.7%	13.2%	2.3%***	57.8%***	55.5%	74.3%	66.1%	43.7%	8.2%***	30.6%***	22.4%
Total Options	Mean	\$3.93	\$1.17	\$0.09	\$2.76***	\$3.84	\$1.10	\$8.41	\$3.36	\$0.65	\$5.04	\$7.76***	\$2.72
(in \$ millions)	Median	\$1.78	\$1.17	\$0.09	\$0.61***	\$1.69***	\$1.10	\$2.74	\$1.55	\$0.39	\$1.18***	\$2.34***	\$1.16
Variable Compensation	Mean	61.9%	55.2%	51.8%	6.7%	10.2%	3.5%	73.8%	69.0%	45.4%	4.8%	28.4%***	23.6%**
(% of total compensation & options)	Median	59.7%	58.0%	54.6%	1.7%***	5.1%***	3.4%	82.5%	69.8%	50.2%	12.7%***	32.3%***	19.6%
Total Compensation	Mean	\$1.06	\$0.77	\$1.36	\$0.29*	−\$0.30	−\$0.59*	\$1.62	\$1.09	\$0.77	\$0.53	\$0.84**	\$0.32
(excludes options, in \$ millions)	Median	\$0.78	\$0.68	\$0.82	\$0.10***	−\$0.04***	−\$0.14	\$0.95	\$0.72	\$0.60	\$0.23***	\$0.35***	\$0.12

(*continued on next page*)

TABLE 3 (continued)

***, **, * Significance at the 0.01, 0.05, and 0.10 level, respectively.

[a] Differences in means are tested for significance using a two-tailed t-test; differences in medians are tested for significance using a two-tailed Wilcoxon signed rank test.

Variable Definitions:

Chair is CEO = the percentage of firms for which the CEO is the chairman of the board of directors;
Insiders = the number of directors who serve as executives in the firm divided by total board size;
PE Sponsors on Board = the number of directors who represent PE sponsors divided by total board size;
Board Size = the total number of directors on the board;
Options = the total options divided by the sum of the total compensation and total options;
Total Options = the cumulative value of options distributed to the CEO during her/his tenure as well as the cumulative value of options realized (when the cumulative value was absent, the average value of options distributed during the year was used);
Variable Compensation = the sum of the total options, bonus, other annual compensation, and other compensation (excluding salary) divided by the total compensation and total options (note: variable includes instances in which options were NOT distributed); and
Total Compensation = the sum of the salary, bonus, other annual compensation, and other compensation.

on these variables for the PE-backed and management-owned firms in the pre- and post-IPO periods. Consistent with the findings of Cao and Lerner (2007), PE sponsors have a large ownership stake (79.9 percent and 36.4 percent, respectively, for firms that are majority- and minority-owned by PE sponsors). Suggestive of their active role in monitoring management is that 55.2 percent and 34 percent, respectively, of the boards of directors are from or affiliated with PE sponsor groups. Perhaps to accommodate this representation, PE-backed firms' boards are significantly larger than those of management-owned firms. With respect to compensation, a greater proportion of the pay of CEOs in PE-backed firms is in the form of equity and variable compensation, consistent with giving the CEO an incentive to take the company public (Cadman and Sunder 2007). The results in the post-IPO panel are similar: PE sponsors retain a significant ownership stake (48.9 percent and 20.8 percent, respectively, for majority- and minority-owned firms) and continue to monitor managers (50.3 percent and 29.4 percent, respectively, of the boards of directors being from or affiliated with PE sponsor groups).[14]

V. EMPIRICAL RESULTS

Earnings Management

The results of estimating earnings management by abnormal accruals (*UTACC*) and industry-adjusted growth in net operating assets (*GNOA*) are presented in Table 4, Panel A. Consistent with the hypothesis that earnings are managed upward to a lesser extent by PE-backed than by non-PE-backed firms, the first line of Table 4 indicates that the mean values of *UTACC* for firms that are majority- and minority-owned by PE sponsors are −3.7 percent and −4.2 percent, respectively, whereas the mean value for management-owned firms is −0.3 percent. These differences are significant at the 0.01 level. Similar results (some of which are not significant) are obtained for differences in *GNOA*, in the median values, and in the post-IPO period (after including average information to minimize any survival bias). With the exception of the significantly less negative *GNOA* for the majority-PE-owned firms in the pre-IPO period, the analysis reveals no significant differences in the reporting behavior of majority-owned and minority-owned PE-backed firms.[15]

Similar results are obtained when the analysis is repeated on a yearly basis, before and after IPO. For most of the years, the differences in both mean and median values are more negative for PE-backed than for non-PE-backed firms.[16] No inferences are made for the year of the IPO because, as noted earlier, receipt of IPO proceeds might affect accruals and working capital.[17]

Table 4, Panel B reports the results of Regression (2) for the sample of pre- and post-IPO firms under two specifications, (1) including control for possible endogeneity, and (2) including control variables (as defined in Section III). In both periods, for both earnings

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[14] An untabulated analysis further reveals that five years after the IPO, PE sponsors retain a significant ownership stake, 26.8 percent and 16.4 percent, respectively, for majority- and minority-owned firms, compared to 22.9 percent for non-PE-backed, management-owned firms.

[15] Untabulated analyses indicate that the main abnormal accruals results are qualitatively unaltered when other specifications of the Jones model are used (e.g., current accruals [with or without control for timely loss recognition and the balance sheet approach] or the Kothari et al. [2005] performance-matching approach).

[16] Reported results for the pre-IPO and post-IPO periods (but not for the year-by-year analyses) exclude firm-years during restructuring periods. When performed on the entire sample, the results are qualitatively similar.

[17] The last line of Table 4, Panel A reports the results of an abnormal current accruals model for the IPO year. These results are similar in magnitude to those obtained for PE-backed firms by Chou et al. (2006). But whereas Chou et al. (2006) find weak evidence that PE-backed firms have higher discretionary accruals than non-PE-backed firm, I find a weak contrary indication.

TABLE 4
Measures of Earning Management
Magnitude of Abnormal Accruals and Growth in Net Operating Assets

Panel A: Univariate Analysis

		PE Majority			PE Minority			Mgmt			Diff.[a] PE Majority versus PE Minority		Diff. PE Majority versus Mgmt		Diff. PE Minority versus Mgmt	
Years		n	*UTACC* (1)	*GNOA* (2)	n	*UTACC* (3)	*GNOA* (4)	n	*UTACC* (5)	*GNOA* (6)	*UTACC* (1) − (3)	*GNOA* (2) − (4)	*UTACC* (1) − (5)	*GNOA* (2) − (6)	*UTACC* (3) − (5)	*GNOA* (4) − (6)
5 Years Pre-IPO	Mean	277	−3.7%	−4.9%	69	−4.2%	−9.6%	79	−0.3%	−0.9%	0.5%	4.7%**	−3.4%***	−4.0%	−3.9%***	−8.7%*
	Median		−3.5%	−3.2%		−2.1%	−7.9%		−1.1%	−2.9%	−1.4%*	4.7%**	−2.3%***	−0.3%***	−1.0%**	−4.9%**
Avg. 5 Years Post-IPO[b]	Mean	206	−0.3%	−1.5%	81	−1.4%	2.3%	62	3.3%	13.4%	1.1%	−3.7%	−3.6%	−14.9%**	−4.7%	−11.2%*
	Median		−0.6%	−0.8%		−0.2%	1.2%		1.7%	4.9%	−0.4%	1.2%	−2.3%*	−5.6%*	−1.9%	−3.6%
−5	Mean	32	−4.9%	6.0%	5	−8.7%	−22.7%	12	8.8%	15.8%	3.9%	28.7%	−13.7%***	−9.8%	−17.6%**	−38.5%*
	Median		−4.0%	−1.5%		−1.3%	−15.4%		7.1%	−0.6%	−2.7%***	14.0%	−11.1%***	−0.8%	−8.4%***	−14.8%*
−4	Mean	48	−3.5%	−5.5%	11	−25.5%	86.6%	13	−3.8%	7.0%	21.9%	−92.1%	0.3%	−12.5%	−21.6%	79.6%
	Median		−2.8%	−2.6%		−2.3%	−10.0%		−4.0%	−2.2%	−0.6%**	7.4%*	1.2%	−0.4%**	1.8%	−7.9%
−3	Mean	65	−4.3%	−1.1%	18	−4.3%	−8.0%	17	−2.0%	−5.5%	0.0%	6.9%	−2.3%	4.4%	−2.3%	−2.6%
	Median		−3.1%	−6.4%		−0.7%	−7.1%		−1.4%	−6.4%	−2.4%***	0.7%**	−1.7%***	0.0%**	0.8%	−0.7%
−2	Mean	87	−4.3%	1.4%	23	−5.9%	9.3%	20	−0.2%	−3.8%	1.6%	−7.9%	−4.1%*	5.2%	−5.7%**	13.1%
	Median		−3.7%	−6.5%		−4.5%	−5.9%		−1.6%	−4.3%	0.8%**	−0.7%	−2.0%**	−2.2%**	−2.9%*	−1.6%
−1	Mean	96	−4.3%	6.4%	27	−3.5%	5.7%	24	−0.1%	−3.8%	−0.7%	0.7%	−4.1%**	10.2%	−3.4%	9.5%
	Median		−3.9%	−3.3%		−5.4%	−7.9%		1.1%	−5.3%	1.5%***	4.6%	−5.0%***	2.0%	−6.5%**	−2.6%
IPO Year	Mean	84	−1.9%	5.7%	24	0.5%	25.1%	24	7.3%	365.4%	−2.4%	−19.4%	−9.2%	−359.7%	−6.8%	−340.3%
	Median		−1.3%	0.0%		0.5%	−2.0%		1.1%	12.7%	−1.7%***	2.0%	−2.4%**	−12.7%*	−0.6%	−14.7%
+1	Mean	70	0.6%	11.9%	23	0.5%	−0.5%	21	1.1%	46.9%	0.1%	12.4%*	−0.5%	−34.9%	−0.6%	−47.3%*
	Median		0.3%	0.0%		0.2%	−2.4%		−1.1%	6.6%	0.1%	2.4%	1.3%	−6.6%	1.2%	−9.0%*
+2	Mean	60	−1.8%	3.8%	22	−3.3%	3.0%	17	16.1%	8.9%	1.5%	0.8%	−17.9%	−5.1%	−19.4%	−6.0%
	Median		−1.2%	0.0%		−2.1%	−0.3%		−0.4%	0.3%	0.9%	0.3%	−0.8%	−0.3%	−1.7%	−0.6%
+3	Mean	49	4.3%	−1.9%	20	−0.2%	8.7%	14	0.4%	2.8%	4.5%	−10.6%	3.9%	−4.7%	−0.5%	5.9%
	Median		−0.8%	−4.3%		−0.3%	0.1%		2.9%	−0.9%	−0.5%	−4.4%*	−3.7%**	−3.4%**	−3.2%	1.0%
+4	Mean	41	−1.5%	−6.9%	15	−4.0%	10.7%	12	−5.7%	−6.8%	2.6%	−17.7%	4.2%	−0.1%	1.6%	17.5%
	Median		0.1%	−2.4%		−2.6%	−5.4%		−1.3%	1.6%	2.7%	3.0%	1.4%	−4.0%*	−1.3%	−7.0%
+5	Mean	34	−1.5%	6.2%	14	−1.3%	−3.1%	12	−0.8%	17.6%	−0.2%	9.3%	−0.7%	−11.4%	−0.5%	−20.7%
	Median		−1.0%	0.5%		−1.8%	−8.6%		0.1%	−1.7%	0.8%	9.1%	−1.1%	2.2%	−2.0%	−6.9%*
IPO Year	Mean	84	2.2%		24	3.7%		24	12.3%		−1.5%		−10.2%		−8.6%	
Current *UACC*[c]	Median		1.4%			2.6%			3.1%		−1.2%		−1.7%**		−0.5%	

(*continued on next page*)

TABLE 4 (continued)

Panel B: Multivariate Analysis

		PE-Backed versus Management															
		Five Years Pre-IPO								Five Years Post-IPO							
		UTACC				*GNOA*				*UTACC*				*GNOA*			
Independent Variable	**Predicted Sign**	**Coef. (1)**	**t-stat (1)**	**Coef. (2)**	**t-stat (2)**	**Coef. (3)**	**t-stat (3)**	**Coef. (4)**	**t-stat (4)**	**Coef. (5)**	**t-stat (5)**	**Coef. (6)**	**t-stat (6)**	**Coef. (7)**	**t-stat (7)**	**Coef. (8)**	**t-stat (8)**
Intercept (a_0)	?	0.031	1.37	−0.124	−2.74***	0.197	2.59***	−0.247	−1.66*	0.134	1.33	0.167	1.09	0.964	6.91***	−0.492	−2.28**
PE (a_1)	−	−0.081	−3.41***	−0.022	−2.35**	−0.305	−3.81***	−0.022	−0.74	−0.156	−1.51	−0.071	−2.47**	−1.029	−6.16***	−0.122	−2.99***
LAMBDA		0.030	1.74*			0.154	2.72***			0.052	0.73			0.587	5.81***		
*PE*LAMBDA*		0.020	0.76			0.024	0.29			−0.018	−0.19			−0.395	−2.82***		
Pseudo-R^2		67.92%				67.92%				49.69%				49.69%			
ln(Total Assets)				−0.014	−1.99**			0.032	1.33			0.005	0.19			0.010	0.30
ln(Sales)				0.020	2.56**			−0.008	−0.30			−0.017	−0.64			0.014	0.38
Book Value/Total Assets				0.070	2.00**			0.083	0.72			−0.034	−0.31			0.374	2.42**
Sales Growth				−0.062	−2.97***			0.183	2.72***			−0.040	−0.54			0.074	0.70
Leverage				0.023	0.66			0.001	0.01			0.000	0.00			0.193	1.26
RNOA				0.036	4.7***			−0.009	−0.38			0.137	1.60			0.784	6.4***
Q-Ratio				0.016	1.96*			0.065	2.45**			0.024	0.85			0.042	1.04
Oper_Cycle				0.000	1.59			0.000	0.67			0.000	0.52			0.000	2.11**
Age				0.000	0.37			−0.001	−0.94			0.000	−0.05			−0.001	−0.92
Cash/Total Assets				−0.104	−1.43			−0.238	−1.00			−0.198	−1.05			0.501	1.85*
CAPEX/Total Assets				−0.079	−0.79			0.813	−2.48**			0.015	0.06			0.459	1.20
D_Loss				−0.032	−4.44***			−0.031	−1.33			−0.055	−1.79*			0.087	1.97**
D_Audit_Quality				0.057	2.69***			−0.011	−0.15			−0.031	−0.40			0.047	0.42
Adj-R^2		5.69%		26.25%		6.20%		13.37%		1.70%		3.92%		14.79%		27.87%	
No. of Observations		297		297		304		304		319		319		324		324	

***, **, * Significance at the 0.01, 0.05, and 0.10 level, respectively.

[a] Differences in means are tested for significance using a two-tailed t-test; differences in medians are tested for significance using a two-tailed Wilcoxon signed rank test.

[b] The average of five years' annual *UTACC* and *GNOA* variables. For firms that do not survive for five full years after the IPO, the maximum number of years for which Compustat data is available is used.

[c] Current unexpected discretionary accruals are derived from the cross-sectional modified Jones model used by Teoh et al. (1998a, 1998b) where current accruals are defined as the difference between the change in noncash current assets and the change in current operating liabilities.

[d] MacKelvey-Zavonia Pseudo-R^2 for the first stage PROBIT model in the Heckman (1979) procedure.

(continued on next page)

TABLE 4 (continued)

Panel A's summary of five years' pre-IPO and five years' post-IPO excludes firm-year observations during restructuring periods. The distribution of each variable is truncated at the extreme ±1 percent values.

Variable Definitions:

UTACC = unexpected discretionary total accruals derived from the cross-sectional modified Jones model. To control for the asymmetric recognition of gains and losses, the modified Jones model is augmented with the following independent variables: cash flow from operations in year t (CF_t), a dummy variable set to 1 if $CF_t < 1$, and 0 otherwise (DCF_t), and an interactive variable, $CF_t \times DCF_t$;

GNOA = industry-adjusted growth in net operating assets after subtracting the industry median (same four-digit SIC codes) *GNOA* for the same year:

$GNOA_{j,t}$ = $(NOA_{j,t} - NOA_{j,t-1})/|NOA_{j,t-1}|$, where *NOA* is defined as common equity (#60) + debt in current liabilities (#34) + total long-term debt (#9) + preferred stock (#130) − cash and short-term investments (#1) − investments and advances (#32) + minority interest (#38);

PE = a dummy variable set to 1 for PE-backed firms (both majority- and minority-owned), and 0 for firms owned by management;

LAMBDA = following the Heckman (1979) procedure, in the first stage a PROBIT model is estimated with, as predictors, size (alternatively defined as the natural logarithms of total assets or sales), ratio of book value of equity to total assets, growth (in sales), leverage, profitability (operating income divided by net operating assets), quick ratio, length of the operating cycle, age, cash and capital expenditures (both divided by total assets), a dummy for loss firms, and audit quality (a dummy for the big national accounting firms). Estimates of the PROBIT model are used to compute an inverse Mills' ratio for each firm; in the second stage, the inverse Mills' ratio is added to Equation (2) as a control variable. To allow its coefficient to vary between the two groups of firms, an interactive variable (*PE* * *LAMBDA*) is also included;

ln(Total Assets) = the natural logarithm of total assets (#6);

ln(Total Sales) = the natural logarithm of total sales (#12);

Book Value = the book value of equity: total common equity (#60) + carrying value of preferred stock (#130) + deferred taxes and investment tax credit (#35);

Sales Growth = defined in Table 2;

Leverage = defined in Table 2;

RNOA = operating income (*OpI*) divided by net operating assets at end of year $t-1$ (NOA_{t-1}), where *NOA* is as defined in *GNOA*, *OpI* is defined as net income (#172) + change in cumulative translation adjustment (#230) + after-tax interest expense (#15 × (1 − marginal tax rate)) − after-tax interest income (#62 × (1 − marginal tax rate)) + minority interest in income (#49), where the marginal tax rate is the top statutory federal tax rate plus 2 percent average state tax rate. The top federal statutory corporate tax rate was 48 percent in 1971–1978, 46 percent in 1979–1986, 40 percent in 1987, 34 percent in 1988–1992, and 35 percent in 1993–2003;

Q-Ratio = defined in Table 2;

Oper_Cycle = operating cycle days (receivable collection period plus inventory turnover in days), calculated as: (yearly average accounts receivable #2)/(total revenues/360 #12) + (yearly average inventory #3)/(cost of goods sold/360 #41);

Age = the number of years since incorporation (first appearance on Compustat);

Cash = defined in Table 2;

CAPEX = capital expenditures (#128) divided by total assets at end of year t (#6);

D_Loss = a dummy variable set to 1 for firms with negative net income (#172) during year t, and 0 otherwise; and

D_Audit_Quality = a dummy variable set to 1 for firms audited by one of the big national auditing firms (#149).

management measures and under both specifications, the coefficients, a_1, the dummy variables for PE-backed firms, are negative, generally significantly so, indicating that earnings are managed upward to a lesser extent by PE-backed firms than by non-PE-backed firms. Moreover, the coefficients of the inverse Mills' variables (lambda) are significant when performing the regression on *GNOA*, suggesting the presence of endogeneity and the appropriateness of controlling for it.

Untabulated analyses further reveal the foregoing results to hold for the comparison of both majority- and minority-PE-owned firms versus management-owned firms, and no significant differences between firms that are majority-owned and those that are minority-owned by PE sponsors.

Overall, and consistent with H1, these results indicate that non-PE-backed firms manage earnings upward to a greater extent than PE-backed firms, as indicated by the significantly higher abnormal accruals and *GNOA*.

Timely Loss Recognition

Table 5 reports the results of Regression (3) for the sample of pre- and post-IPO firms under three specifications, (1) excluding control variables, (2) including control for possible endogeneity, and (3) including control variables.

For non-PE-backed private firms in the pre-IPO period, the coefficients, a_2, on prior positive earnings changes are significantly negative, indicating timely recognition of economic gains (on average, approximately 45 percent to 105 percent reversal of income increases). The incremental coefficients, a_3, on prior negative earnings changes are positive (but significant only under specifications (2) and (3)), indicating that losses are recognized on a less timely basis than gains. The sum of the coefficients, $a_2 + a_3$, is negative under all specifications, but relatively small (coefficients' sums range from -0.05 to -0.30), indicating timely loss recognition, which leads to a reversal of income decreases (on average, approximately 5 percent to 30 percent). Taken together, these results suggest that compared with PE-backed private firms, non-PE-backed private firms have lower earnings quality as measured by deferred loss recognition.

The incremental coefficients on earnings increases for PE-backed private firms, a_6, are significantly positive under the three specifications (with coefficients of 0.55, 0.74, and 1.19), indicating that PE-backed private firms are more likely than non-PE-backed private firms to defer recognition of economic gains. As further hypothesized, the incremental coefficients on earnings, a_7, decrease for PE-backed firms, and the sum of the coefficients, $a_3 + a_7$, is significantly negative under all specifications, indicating that PE-backed private firms are more likely than non-PE-backed private firms to incorporate transitory losses in income. These results remain qualitatively similar when earnings before and after extraordinary items are used instead of operating income.

Table 5 also presents the results of Regression (3) for the sample of post-IPO firms. The sum of the coefficients, $a_3 + a_7$, is significantly negative under the three regression specifications, and the main coefficient of interest, a_7, is negative (but significant only under specifications (1) and (2)).

Taken together, and consistent with H2, PE-backed private firms have higher-quality earnings reports than non-PE-backed private firms in both the pre-IPO and post-IPO periods.

Table 6 reports the results of Regression (4), under the above three specifications, for the sample of pre- and post-IPO firms. For non-PE-backed, pre-IPO private firms, the coefficient on prior positive cash flow, b_2, is significantly negative, indicating that, on average, between 28 percent and 62 percent of cash flow is mitigated by accruals in years with positive cash flow. The coefficient on prior negative cash flow, b_3, is negative as well

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TABLE 5
Timely Loss Recognition by Ownership Structure

$$\Delta OpI_t = a_0 + a_1{*}D\Delta OpI_{t-1} + a_2{*}\Delta OpI_{t-1} + a_3{*}D\Delta OpI_{t-1}{*}\Delta OpI_{t-1} + a_4{*}PE + a_5{*}PE{*}D\Delta OpI_{t-1} + a_6{*}PE{*}\Delta OpI_{t-1} + a_7{*}PE{*}D\Delta OpI_{t-1}{*}\Delta OpI_{t-1} + e_t$$

Independent Variable		Predicted Sign	Five Years Pre-IPO Coef. (1)	t-stat (1)	Coef. (2)	t-stat (2)	Coef. (3)	t-stat (3)	Five Years Post-IPO Coef. (4)	t-stat (4)	Coef. (5)	t-stat (5)	Coef. (6)	t-stat (6)
Intercept	(a_0)	?	0.015	0.69	0.061	1.39	−0.182	−2.57**	0.018	0.66	0.046	0.52	−0.035	−0.38
$D\Delta OpI_{t-1}$	(a_1)	?	0.010	0.28	−0.006	−0.19	0.004	0.15	0.009	0.19	0.017	0.37	0.028	0.76
ΔOPI_{t-1}	(a_2)	?	−0.445	−1.7*	−0.844	−3.06***	−1.052	−5.3***	−0.093	−0.50	−0.151	−0.77	−0.084	−0.55
$D\Delta OpI_{t-1}{*}\Delta OpI_{t-1}$	(a_3)	?	0.396	1.06	0.764	2.2**	0.752	2.93**	0.342	1.04	0.560	1.29	−0.533	−1.38
PE	(a_4)	?	−0.028	−1.05	−0.043	−0.93	−0.041	−2.21**	−0.026	−0.84	−0.013	−0.14	0.002	0.07
$PE{*}D\Delta OpI_{t-1}$	(a_5)	?	−0.013	−0.33	−0.023	−0.61	0.022	0.84	−0.029	−0.58	−0.035	−0.68	−0.014	−0.35
$PE{*}\Delta OpI_{t-1}$	(a_6)	+	0.548	1.68*	0.741	2.3**	1.185	5.12***	0.064	0.30	0.088	0.39	−0.069	−0.40
$PE{*}D\Delta OpI_{t-1}{*}\Delta OpI_{t-1}$	(a_7)	−	−1.023	−2.37**	−1.182	−3.01***	−1.343	−4.74***	−1.017	−2.71***	−1.128	−2.41**	−0.024	−0.06
LAMBDA		?			0.026	0.81					0.033	0.54		
*PE*LAMBDA*		?			−0.043	−0.99					−0.177	−1.29		
Pseudo-R^{2a}					59.51%						51.37%			
ln(Total Assets)							−0.012	−1.10					−0.009	−0.64
ln(Sales)							0.023	1.99**					0.005	0.35
Book Value/Total Assets							0.113	2.13**					0.035	0.49
Sales Growth							0.058	1.65					0.037	0.96
Leverage							0.102	1.93*					0.077	1.17
RNOA							0.660	12.66***					0.693	9.11***
Q-Ratio							−0.010	−0.84					−0.009	−0.55
Oper_Cycle							0.000	1.72*					0.000	−1.09
Age							−0.001	−2.46**					0.000	0.72
Cash/Total Assets							0.020	0.18					0.003	0.02
CAPEX/Total Assets							−0.248	−1.52					−0.642	−3.76***
D_Loss							0.005	0.47					−0.035	−1.88*
D_Audit_Quality							0.006	0.21					−0.006	−0.15
Adj-R^2			11.06%		19.11%		63.08%		7.21%		9.88%		49.00%	
No. of Observations			258		210		210		306		246		246	

(*continued on next page*)

TABLE 5 (continued)

***, **, * Significance at the 0.01, 0.05, and 0.10 level, respectively.

[a] MacKelvey-Zavonia Pseudo-R^2 for the first stage PROBIT model in the Heckman (1979) procedure.

Each variable in the table is truncated at the extreme ±1 percent values of its distribution.

Variable Definitions:

ΔOpI = a change in the operating income from year $t-1$ to year t, standardized by net operating assets at the end of year t–1; Operating income (*OpI*) and net operating assets (NOA) are both as defined in Table 4; and

$D\Delta OpI$ = a dummy variable set to 1 if $\Delta OpI < 0$, and 0 otherwise

PE and all control variables are as defined in Table 4.

TABLE 6
Accrual Model for Timely Loss Recognition by Ownership Structure

$$ACC_t = b_0 + b_1{*}DCFO_t + b_2{*}CFO_t + b_3{*}DCFO_t{*}CFO_t + b_4{*}PE + b_5{*}PE{*}DCFO_t + b_6{*}PE{*}CFO_t + b_7{*}PE{*}DCFO_t{*}CFO_t + e_t$$

			Five Years Pre-IPO						Five Years Post-IPO					
Independent Variable		**Predicted Sign**	**Coef. (1)**	**t-stat (1)**	**Coef. (2)**	**t-stat (2)**	**Coef. (3)**	**t-stat (3)**	**Coef. (4)**	**t-stat (4)**	**Coef. (5)**	**t-stat (5)**	**Coef. (6)**	**t-stat (6)**
Intercept	(b_0)	?	−0.038	−3.05***	−0.010	−0.40	−0.012	−0.28	−0.020	−1.54	−0.055	−1.73*	−0.088	−2.35**
DCFO$_t$	(b_1)	?	0.021	0.49	0.053	1.18	0.013	0.29	0.056	1.36	0.042	1.15	0.041	1.27
CFO$_t$	(b_2)	−	−0.284	−2.38**	−0.375	−2.51**	−0.615	−3.94***	−0.406	−3.65***	−0.397	−3.29**	−0.466	−4.39***
*DCFO$_t$*CFO$_t$*	(b_3)	?	−2.037	−2.15**	−1.427	−1.60	−1.471	−1.65*	0.498	0.49	0.376	0.44	0.101	0.13
PE	(b_4)	?	0.010	0.72	−0.036	−1.47	−0.010	−0.68	0.012	0.84	0.054	1.65*	0.012	0.89
*PE*DCFO$_t$*	(b_5)	?	−0.014	−0.30	−0.035	−0.74	−0.006	−0.13	−0.084	−1.90*	−0.043	−1.04	−0.039	−1.06
*PE*CFO$_t$*	(b_6)	?	−0.365	−2.77***	−0.170	−1.05	0.070	0.42	−0.118	−0.95	−0.077	−0.58	−0.050	−0.42
*PE*DCFO$_t$*CFO$_t$*	(b_7)	+	2.506	2.58**	1.593	1.68*	1.502	1.59	−0.210	−0.20	−0.543	−0.59	−0.101	−0.12
LAMBDA		?			0.020	1.32					−0.022	−1.14		
*PE*LAMBDA*		?			0.022	1.08					−0.011	−0.40		
Pseudo-R^{2a}					57.65%						51.69%			
ln(Total Assets)							−0.020	−3.12***					−0.010	−1.79*
ln(Sales)							0.018	2.64**					0.013	1.97**
Book Value/Total Assets							0.013	0.43					0.080	2.87***
Sales Growth							0.001	0.05					0.030	1.99**

(*continued on next page*)

TABLE 6 (continued)

Independent Variable	Predicted Sign	Five Years Pre-IPO Coef. (1)	t-stat (1)	Coef. (2)	t-stat (2)	Coef. (3)	t-stat (3)	Five Years Post-IPO Coef. (4)	t-stat (4)	Coef. (5)	t-stat (5)	Coef. (6)	t-stat (6)
Leverage						−0.041	−1.38					−0.006	−0.23
Q-Ratio						0.019	2.88***					0.007	1.81*
Oper_Cycle						0.000	0.87					0.000	3.57***
Age						0.000	0.90					0.000	0.02
Cash/Total Assets						−0.104	−1.63					−0.141	−2.43**
CAPEX/Total Assets						0.166	1.84*					0.047	0.61
D_Audit_Quality						0.001	0.08					0.009	0.56
Adj-R^2		36.33%		36.67%		42.07%		24.41%		31.62%		45.30%	
No. of Observations		371		293		293		400		295		295	

***, **, * Significance at the 0.01, 0.05, and 0.10 level, respectively.

[a] MacKelvey-Zavonia Pseudo-R^2 for the first stage PROBIT model in the Heckman (1979) procedure.

Each variable in the table is truncated at the extreme ±1 percent values of its distribution.

Variable Definitions:
ACC = total accruals divided by total assets at end of year $t-1$, as defined in Table 2;
CFO = cash flow from operations divided by total assets at the end of year $t-1$, as defined in Table 2; and
DCFO = a dummy variable that is 1 if $CFO_t < 0$, and 0 otherwise.

PE and all control variables are as defined in Table 4.

(but insignificant under specification (2)), indicating that non-PE-backed private firms mitigate noise in cash flow to an even greater degree in years with negative operating cash flow.

The incremental coefficient, b_6, for PE-backed private firms in positive-cash-flow years is negative (but significant only in specification (1)), indicating that PE-backed private firms are more likely than non-PE-backed private firms to offset cash flow in years with positive cash flow. Also as hypothesized, the incremental coefficient in negative-cash-flow years, b_7, for PE-backed private firms is significantly positive under specifications (1) and (2), indicating that in negative-cash-flow years, the accruals of PE-backed private firms offset cash flow to a lesser extent than is the case for non-PE-backed private firms. The fact that the coefficients of the inverse Mills' variables (lambda) are not significant in the pre- or post-IPO period under both regression models, (3) and (4), suggests the absence of significant endogeneity problems.

Further analyses (untabulated) reveal that the results of both conservatism regression models, (3) and (4), hold for the comparison of both majority- and minority-PE-owned firms versus management-owned firms. They provide weak evidence that firms that are majority-owned by PE sponsors report more conservatively than firms that are minority-owned by PE sponsors.[18]

Overall, and consistent with H2, earnings reports in the pre-IPO period are of higher quality for PE-backed private firms than for non-PE-backed private firms. Although the involvement of PE sponsors appears to induce higher quality earnings reports in the years prior to an IPO, as indicated in Table 6, these results no longer hold in the post-IPO period.[19]

Abnormal Returns and Financial Performance

Table 7, Panel A reports the results of both size-and-book-to-market-adjusted buy-and-hold returns and the financial performance analyses. The abnormal returns (between one year and five years) are significantly higher for firms majority-owned than for firms minority-owned by PE sponsors.[20] For example, the mean one-year abnormal return for majority-owned PE-backed firms is 19.1 percent (median of 8.8 percent), but the mean for minority-owned PE-backed firms is −9.3 percent (median of −18.3 percent). This difference of 28.5 percent (27.1 percent) is significant at the 0.01 level for the medians. In the one-year and three-year periods after the IPO, the median returns for PE-backed, majority-owned firms are also significantly higher than for management-owned firms. PE-backed, minority-owned firms have the lowest abnormal returns in the one-, three-, and five-year periods.

Table 7, Panel A documents that PE-backed, minority-owned firms also have the lowest post-IPO financial performance. In particular, they have the lowest (but not statistically significant) industry-adjusted ROA and market-to-book ratios (statistically significant for

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[18] I re-estimated the earnings management and conservatism regression models (2), (3), and (4) with an industry fixed effect and also controlled for the reduction in ownership stake after the IPO (on both an absolute and a relative basis, and for both PE-backed and non-PE-backed firms). All results were qualitatively the same.

[19] Prior literature finds that publicly listed firms report more conservatively than private firms to accommodate shareholder demand for higher quality earnings reporting and reduce shareholder litigation costs (Givoly, Hayn, and Katz 2007). Because these incentives exist as soon as firms are publicly listed, regardless of the initial controlling party, they can increase timely loss recognition among non-PE-backed firms as well, and thereby reduce the differences between them and PE-backed firms in the post-IPO period. Indeed, an analysis of this indicates that post-IPO firms report more conservatively (and also have greater upward earnings management) than pre-IPO firms, regardless of the initial controlling party.

[20] The use of other benchmarks, such as the value-weighted market return index or S&P composite index, yields qualitatively similar results. The results are also qualitatively the same for cumulative abnormal returns.

TABLE 7
Market-Adjusted Performance by Ownership Structure

Panel A: Market-Adjusted Performance

		PE Majority (1)	PE Minority (2)	Mgmt (3)	Diff.[a] (1) − (2)	Diff. (1) − (3)	Diff. (2) − (3)
No. of Firms		92	26	21			
Size and Book-to-Market (5 x 5) Adj. Returns[b]							
1 Year	Mean	19.1%	−9.3%	3.9%	28.5%	15.3%	−13.2%
	t-stat				(2.66)	(1.81)	(−0.97)
	Median	8.8%	−18.3%	−12.6%	27.1%***	21.4%**	−5.7%
3 Year	Mean	19.0%	−27.5%	−4.9%	46.5%	23.9%	−22.6%
	t-stat				(2.59)	(1.15)	(−0.86)
	Median	9.7%	−36.7%	−16.8%	46.3%**	26.5%*	−19.9%
5 Year	Mean	17.3%	−56.8%	−3.5%	74.1%	20.8%	−53.4
	t-stat				(2.67)	(0.58)	(−1.66)
	Median	−0.4%	−66.3%	−12.9%	65.9%*	12.5%	−53.4*
Industry Adj. ROA							
1 Year	Mean	0.7%	0.5%	1.7%	0.2%	−1.0%	−1.2%
	Median	0.5%	0.7%	1.9%	−0.3%	−1.4%	−1.2%
3 Year	Mean	−0.2%	−1.1%	−0.1%	1.0%	−0.1%	−1.1%
	Median	−0.2%	−0.1%	−0.7%	−0.1%	0.4%	0.5%
5 Year	Mean	−0.2%	−1.1%	0.4%	1.0%	−0.6%	−1.5%
	Median	−0.2%	−0.6%	0.0%	0.5%	−0.1%	−0.6%
Market-to-Book							
1 Year	Mean	3.28	2.26	3.19	1.01	0.09	−0.92
	Median	2.14	2.05	2.20	0.09***	−0.06***	−0.15
3 Year	Mean	2.31	1.75	3.03	0.57	−0.72	−1.29*
	Median	2.08	1.49	2.93	0.59***	−0.85***	−1.44
5 Year	Mean	2.77	2.01	2.84	0.76	−0.07	−0.83
	Median	2.36	1.86	1.62	0.50***	0.74***	0.24
Delisting							
1 Year	Mean	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3 Year	Mean	0.0%	7.7%	0.0%	−7.7%	0.0%	7.7%
5 Year	Mean	5.4%	11.5%	4.8%	−6.1%	0.7%	6.8%
Pre-IPO UTACC	Mean	−4.0%	−4.7%	0.4%	0.7%	−4.4%***	−5.1%***
	Median	−3.5%	−3.7%	0.7%	0.2%***	−4.2%***	−4.3%***
Underwriter Reputation	Mean	8.82	8.78	8.32	0.04	0.50	0.46
	Median	9.10	9.10	8.83	0.00	0.27***	0.27
Large PE Sponsors	Mean	32.6%	3.8%		28.8%***		

Panel B: Fama-French Three Factors Calendar Time Portfolio Regressions[c]

	1 Year Ret		3 Years Ret		5 Years Ret	
Independent Variable	Coef. (1)	t-stat (1)	Coef. (2)	t-stat (2)	Coef. (3)	t-stat (3)
PE Majority						
Intercept	0.004	0.82	0.003	0.99	0.001	0.39

(*continued on next page*)

TABLE 7 (continued)

Independent Variable	1 Year Ret Coef. (1)	1 Year Ret t-stat (1)	3 Years Ret Coef. (2)	3 Years Ret t-stat (2)	5 Years Ret Coef. (3)	5 Years Ret t-stat (3)
RMF	1.211	7.77***	0.953	9.41***	0.911	10.28***
SMB	0.915	4.72***	0.742	5.92***	0.753	6.87***
HML	0.328	1.43	0.336	2.28**	0.386	2.99***
Adj-R^2	31.90%		38.78%		43.55%	
No. of Observations	197		219		219	
PE Minority						
Intercept	−0.014	−1.36	−0.006	−1.13	−0.004	−0.87
RMF	1.527	4.99***	1.128	7.05***	1.162	8.7***
SMB	0.985	2.41**	1.070	5.33***	1.026	6.13***
HML	0.507	1.11	0.255	1.08	0.352	1.78*
Adj-R^2	18.83%		28.99%		36.63%	
No. of Observations	149		232		232	
Mgmt						
Intercept	−0.009	−0.95	−0.001	−0.08	−0.009	−1.51
RMF	1.382	4.65***	1.148	5.56***	1.289	7.61***
SMB	0.512	1.57	0.889	3.82***	0.629	3.05***
HML	0.793	1.91*	0.281	1.01	0.460	1.89*
Adj-R^2	14.58%		22.51%		25.12%	
No. of Observations	121		174		213	

***, **, * Significance at the 0.01, 0.05, and 0.10 level, respectively.

The distribution of each variable is winsorized at the extreme ± 1 percent values.

[a] Differences in means are tested for significance using a two-tailed t-test; differences in medians are tested for significance using a two-tailed Wilcoxon signed rank test.

[b] Due to the cross-correlation problem, the t-statistics for abnormal returns should not be translated into p-values; these t-statistics appear in parentheses.

[c] Regression coefficients estimated in calendar time from the Fama-French (1993) three-factor regression model:

$$R_{pt} - R_{ft} = a_p + b_p(R_{mt} - R_{ft}) + s_p SMB_t + h_p HML_t + \varepsilon_t$$

where:

R_{pt} = the equally weighted portfolio returns in calendar month t;
R_{ft} = the 30-day T-bill yield in month t;
R_{mt} = the return on the value weighted CRSP index;
SMB_t = the return on small firms minus the return on large firms; and
HML_t = the return on high book-to-market stocks minus the return on low book-to-market stocks in month t.

Variable Definitions:

Size and Book-to-Market (5 × 5) Adj. Returns = calculated, for each IPO, as the buy-and-hold daily returns on the periods of one year, three years, and five years after the IPO, less the buy-and-hold returns on a Fama and French size and book-to-market (5 × 5) matched portfolio of daily value-weighted market returns index over the same period. If the sample firm delists during the relevant period, then the delist return is added to the firm's buy-and-hold return and the market-adjusted return is set equal to 0 after the delisting date;

Industry Adj. ROA = the average of one year, three years, or five years after the IPO matched-adjusted return on assets (as defined in Table 2) minus the industry median ROA for the same period (based on four-digit SIC codes). For firms that do not survive for the full one year, three years, or five years after the IPO, the maximum number of years for which Compustat data is available is used;

Market-to-Book = measured at the end of one year, three years, or five years after the IPO, the maximum number of years for which Compustat data is available years since the IPO. For firms that do not survive the full one year, three years, or five years after

(*continued on next page*)

TABLE 7 (continued)

the IPO, the maximum number of years for which Compustat data is available five years after the IPO, the maximum number of years for which Compustat data is available is used. Market value of equity is defined as common shares outstanding (#25) multiplied by fiscal year closing price (#199). Book value of equity is defined as total common equity (#60) + carrying value of preferred stock (#130) + deferred taxes and investment tax credit (#35);

Delisting = the percentage of firms delisted from the NYSE, Amex, or Nasdaq due to bankruptcy, default, or liquidation (CRSP delisting codes 400 and above);

Pre-IPO UTACC = the average of five years' pre-IPO annual *UTACC*, as defined in Table 4;

Underwriter Reputation = the lead underwriter reputation rankings (source: Jay's Ritter website: http://bear.cba.ufl.edu/ritter/rank.xls.); and

Large PE Sponsors = Warburg Pincus, Carlyle Group, KKR, Apax, Blackstone, Goldman Sachs, J.P. Morgan, Welsh Carson Anderson & Stone, Hicks Muse Tate & Furst, 3i Group, Bain Capital, Thomas H. Lee, Morgan Stanley, and Cinven. Small PE sponsors include all other PE sponsors. PE sponsors are ranked according to total investment (in U.S.$) during the years 1980–2005 (source: Thomson Financials, VentureXpert).

one and three years) as well as the highest percentage of post-IPO delistings. Management-owned firms, on the other hand, have the highest (but not statistically significant) industry-adjusted ROA and market-to-book ratios (statistically significant for the one- and three-year periods), and, consistent with the findings reported in Table 4, the highest level of abnormal accruals in the five-year pre-IPO period.

Table 7, Panel B reports, separately for the different ownership groups, the results of the Fama-French three-factor calendar time portfolio Regression (5). Consistent with the finding above, Panel B indicates that PE-backed, minority-owned firms have the lowest average monthly abnormal returns in the one- and three-year periods (as captured by the estimate of the intercept), and PE-backed, majority-owned firms the highest average monthly abnormal returns. These results, however, are statistically insignificant.

Taken together, and consistent with H3, these results suggest that firms in which PE sponsors have a majority ownership have higher abnormal returns than firms owned by management despite their lower financial performance. These results can be attributed to the PE sponsors' higher earnings quality (less engagement in upward earnings management and timelier loss recognition) and capacity for closer monitoring and control, both pre- and post-IPO. The poorer abnormal returns of PE-backed firms with minority ownership can be attributed to their poor financial performance, and the lesser degree of monitoring and control exercised by owners with a minority stake (as indicated in Table 3).

PE Sponsor Size

Table 7 indicates that a significantly higher percentage of firms that are majority owned by PE sponsors are also owned by large PE sponsors (those with greater capital under management). PE sponsor size having been identified as a good proxy for PE sponsor reputation (Cao and Lerner 2007), firms with larger, more reputable PE sponsors are expected to establish better governance practices, exercise closer monitoring, and thus be associated with better earnings quality and financial performance in the post-IPO period (Ivanov et al. 2008; Wongsunwai 2008).[21]

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[21] Cao and Lerner (2007) attribute superior post-IPO returns earned by firms with larger PE sponsors to these repeated players' concern for their reputations. Smaller PE sponsors, on the other hand, might have greater need of external financing and so be more strongly motivated to increase the quality of their reported earnings in order to be able to secure cheaper public debt (Bharath et al. 2008).

Further analyses (untabulated) yield only weak evidence that firms owned by large PE sponsors have higher earnings quality, that is, engage in less upward earnings management (only in the pre-IPO period) and report more conservatively, than firms owned by small PE sponsors.

Table 8, Panel A shows the abnormal returns and financial performance of firms owned by large PE sponsors relative to firms owned by small PE sponsors. Overall, abnormal returns and the industry-adjusted ROA are significantly higher for firms owned by large PE sponsors. These firms also have a lower percentage of delisting. The results of the market-to-book ratios are mixed. Table 8, Panel B reports the results of the Fama-French three-factor calendar time portfolio Regression (5). Consistent with the finding above, firms owned by larger PE sponsors have higher average monthly abnormal returns (significant for the one-year period). These results indicate that lower engagement in pre-IPO earnings management and the ability of large PE sponsors to provide a higher level of monitoring and support leads to better long-term financial and market-adjusted performance of firms owned by larger PE sponsors.[22]

VI. ROBUSTNESS CHECKS

Transition Periods

To rule out earnings management during other organizational changes as an influencing factor in the above analyses, I identify specific earnings-management incentives that arise for firms engaged in "going private" transactions such as LBOs and MBOs as well as in other contexts such as M&A and bankruptcy. Overall, my findings are consistent with the results reported in the prior literature. First, the unexpected discretionary accruals are lower in the two years prior to an MBO transaction, consistent with managers' incentive to act in their own financial interest and influence firm price in their favor (DeAngelo 1986; Marquardt and Wiedman 2004; Perry and Williams 1994; Wu 1997). Second, unexpected discretionary accruals and growth in net operating assets are higher in the two years prior to an LBO, consistent with entrepreneurs' incentive to manage earnings upward prior to PE financing (Beuselinck et al. 2008). Third, PE-backed public firms appear to manage earnings upward in the years prior to an M&A transaction, consistent with the assumption that these firms can anticipate an acquisition or initiate and plan for a sale, and are therefore able to manage earnings accordingly (Erickson and Wang 1999). Finally, PE-backed public firms appear to manage earnings downward in the two years prior to filing for bankruptcy, consistent with the incentive of managers, especially in public firms, to avoid the threat of lawsuits by stakeholders (Rosner 2003). When I remove observations during these transition periods, the results are qualitatively similar.

Restructuring Activities

Renneboog and Simons (2005) argue that PE sponsors can create a "stronger incentive alignment with a focus on performance and value, the reduction in wasting corporate resources, and the improved monitoring capabilities embedded in the governance structure

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[22] Table 7 further indicates that PE-backed firms have significantly higher underwriter reputation and significantly lower pre-IPO abnormal accruals than management-owned firms. The same is true for firms owned by large PE sponsors relative to firms owned by small PE sponsors (Table 8). Prior literature suggests that lead underwriter reputation can affect long-term IPO returns (e.g., Carter et al. 1998). These rankings, available on Jay Ritter's website, http://bear.cba.ufl.edu/ritter/rank.xls, vary from 1 to 9, 9 being the best reputation. To untangle the influence of these factors as well as the association between PE ownership stake and size, and to verify that the abnormal return results are not driven by them, I further control for PE ownership stake and size, underwriter reputation, and abnormal accruals (when applicable). The main abnormal return results are qualitatively similar.

TABLE 8
Market-Adjusted Performance by PE Sponsor Size

Panel A: Market-Adjusted Performance

		Large PE (1)	Small PE (2)	Diff.[a] (1) − (2)
No. of Firms		31	87	
Size and Book-to-Market (5×5) Adj. Returns[b]				
1 Year	Mean	22.5%	8.8%	13.7%
	t-stat			(1.66)
	Median	9.1%	1.7%	7.3%
3 Year	Mean	42.3%	−2.7%	44.9%
	t-stat			(1.85)
	Median	17.6%	−13.3%	30.8%
5 Year	Mean	65.1%	−27.8%	93.0%
	t-stat			(2.96)
	Median	48.7%	−31.3%	80.0%***
Industry Adj. ROA				
1 Year	Mean	3.3%	−0.3%	3.6%**
	Median	0.4%	0.5%	−0.03%
3 Year	Mean	1.5%	−1.0%	2.5%*
	Median	1.3%	−0.4%	1.7%**
5 Year	Mean	1.2%	−1.0%	2.2%*
	Median	0.8%	−0.7%	1.5%**
Market-to-Book				
1 Year	Mean	1.86	3.53	−1.66
	Median	2.21	2.14	0.07***
3 Year	Mean	1.62	2.38	−0.76
	Median	1.56	2.03	−0.48***
5 Year	Mean	2.83	2.37	0.46
	Median	2.23	2.23	0.01***
Delisting				
1 Year	Mean	0.0%	0.0%	0.0%
3 Year	Mean	0.0%	2.3%	−2.3%
5 Year	Mean	3.2%	8.0%	−4.8%
Pre-IPO UTACC	Mean	−4.6%	−3.9%	−0.7%
	Median	−4.1%	−3.5%	−0.6%***
Underwriter Reputation	Mean	8.95	8.76	0.19*
	Median	9.10	9.10	0.00

Panel B: Fama-French Three Factors Calendar Time Portfolio Regressions

	1 Year Ret		3 Years Ret		5 Years Ret	
Independent Variable	Coef. (1)	t-stat (1)	Coef. (2)	t-stat (2)	Coef. (3)	t-stat (3)
Large PE						
Intercept	0.012	2.59**	0.002	0.70	0.001	0.27
RMF	1.235	8.79***	1.034	9.63***	0.973	10.73***
SMB	0.965	5.56***	0.832	6.39***	0.810	7.36***
HML	0.349	1.71*	0.262	1.69*	0.339	2.58**
Adj-R^2	44.12%		39.26%		44.38%	
No. of Observations	165		252		252	

(*continued on next page*)

TABLE 8 (continued)

Small PE						
Intercept	−0.018	−2.06**	−0.009	−1.55	−0.007	−1.34
RMF	1.332	5.12***	1.020	6.37***	1.107	8.07***
SMB	1.047	3.08***	0.999	4.9***	1.002	5.73***
HML	0.497	1.29	0.335	1.41	0.446	2.18**
Adj-R^2	17.87%		26.47%		34.94%	
No. of Observations	183		198		198	

***, **, * Significance at the 0.01, 0.05, and 0.10 level, respectively.

The distribution of each variable is winsorized at the extreme ±1 percent values.

[a] Differences in means are tested for significance using a two-tailed t-test; differences in medians are tested for significance using a two-tailed Wilcoxon signed rank test.

[b] Due to the cross-correlation problem, the t-statistics for abnormal returns should not be translated into p-values; these t-statistics appear in parentheses.

All variables are as defined in Table 7.

of an LBO." One might thus expect PE-backed firms, especially in the pre-IPO period, to engage in more restructuring activities than non-PE-backed firms. Because this could affect the findings, I identify and compare PE-backed and non-PE-backed firms using several proxies for restructuring activities including magnitude of discontinued operations, involvement in M&A activities, and yearly increase or decrease in assets greater than 50 percent. These analyses indicate that the involvement of the two groups of firms in restructuring activities is not significantly different in the period surrounding an IPO. Further, removing observations during restructuring periods produces qualitatively similar results.[23]

VII. SUMMARY AND CONCLUSIONS

In this study, I explore how the ownership structure of private companies (private equity sponsorship with either majority or minority holdings, and management ownership) affects earnings management, reporting conservatism, and post-IPO performance. The findings indicate that the presence of and monitoring by PE sponsors restrains upward earnings management and induces a higher frequency of timely loss recognition, both pre- and post-IPO. Further, majority ownership by a PE sponsor is associated with better stock price performance relative to management-owned firms. Similarly, larger PE sponsor size is positively associated with both better long-term financial and stock price performance when a firm goes public. These results can be attributed to less upward earnings management, more timely loss recognition, and tighter monitoring and control by large PE sponsors or those holding a majority stake, both pre- and post-IPO. In contrast, firms minority owned by PE sponsors have worse long-term financial and stock price performance in the years following an IPO than management-owned firms because of the lesser ability of these PE sponsors to control and monitor management.

This study has several limitations. Because the sample consists of private firms that, by virtue of having public debt, have publicly available financial statements, the sample size is relatively small. Further, in order to raise public debt these firms are more likely to be larger and to have better earnings quality than other private firms (Bharath et al. 2008). For these reasons, it is unclear whether this sample is representative of other private firms.

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[23] The proportion of special items is significantly higher for majority PE-backed than for non-PE-backed firms in the pre-IPO period. Controlling for these differences by performing the conservatism analyses on earnings definitions that exclude such special items yields qualitatively similar results.

The potential sample selection bias concerns, however, are mitigated to some extent because these limitations apply to both the PE-backed and non-PE-backed firms in the sample.

It is worth exploring the incentives for PE-backed and non-PE-backed firms to manage earnings in order to minimize taxes or manipulate bond prices, and the association of both actions with auditor compensation. Comparing PE-backed and non-PE-backed firms in international settings could enhance the results obtained in this study of domestic firms and shed further light on the effect of institutions on PE-backed and non-PE-backed firms.

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Materiality Decisions and the Correction of Accounting Errors

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ABSTRACT: We test conjectures about the determinants of materiality judgments by examining a financial reporting choice made by firms that discover errors in prior years' financial statements. From late 2004 to mid-2006, more than 250 U.S. firms uncovered .and corrected operating lease accounting errors either by formal restatement—required for errors deemed material—or by a less visible current-period "catch-up" adjustment. We test the role of materiality considerations outlined in SAB No. 99 as well as factors outside authoritative guidance in explaining the correction method chosen. Although both quantitative and qualitative materiality considerations cited in the guidance explain a large portion of the variation in firms' error correction decisions, we find that the prior actions of other firms also appear to play a major role. We also find that clerical considerations, but not strategic disclosure concerns, help explain cross-sectional variation in the timing of firms' error correction announcements.

Keywords: *materiality; accounting errors; restatements; leases.*

JEL Classifications: *M40; M41.*

Data Availability: *Data are available from public sources.*

I. INTRODUCTION

Beginning in late 2004 through mid-2006, more than 250 U.S. firms disclosed that the operating lease accounting methods they had been using violated generally accepted accounting principles (GAAP). The accounting errors involved failing to accrue rent expense during rent holidays, amortizing leasehold improvements too slowly,

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or misclassifying incentive consideration received from landlords.[1] Two distinctly different approaches were used to correct these errors. While some firms formally restated previously issued financial statements, others opted instead to record current-period "catch-up" adjustments. GAAP permits firms to avoid formal restatement when correcting past accounting errors but only if the error is deemed immaterial by management and the independent auditor.

While pronouncements issued by various accounting and auditing regulatory bodies (including the SEC) provide general guidelines for assessing materiality, these pronouncements do not specify "bright-line" criteria for determining if a particular accounting error is material.[2] Instead, preparers and auditors assess materiality based on professional judgment and in light of the particular circumstances surrounding the error. The absence of bright-line criteria means that some materiality decisions may be strategic in their purpose; i.e., influenced by factors beyond regulatory intent and designed to achieve financial reporting goals such as avoiding formal restatement. Legislators and trade groups have called on the SEC to issue a more concrete definition of materiality, criticizing current materiality guidance as too vague (Johnson 2007). In 2007 the SEC formed the Advisory Committee on Improvements to Financial Reporting (CIFR), which has also called for additional guidance on determining whether an error is material and whether a restatement is necessary. CIFR suggests that complexity could be reduced and efficiencies could be gained by encouraging firms to use catch-up adjustments to correct immaterial errors.[3] Our study informs these developments by testing the ability of factors within and outside of the existing materiality guidance to explain the method chosen to correct accounting errors.

The lease accounting errors discovered during 2004–2006 provide fertile ground for testing conjectures about the determinants of materiality judgments and their role in shaping firms' error correction decisions. Several features of the setting are advantageous to archival research: (1) a large number of firms concluded that their accounting methods violated GAAP; (2) similar mistakes were made at each firm; (3) the mistakes were uncovered and corrected during a relatively short span of time; and (4) two quite different approaches were used to correct the mistakes. The inherent homogeneity of this setting enhances our ability to statistically identify the determinants of materiality judgments and their influence on accounting error correction decisions. This setting also enables us to test conjectures about the unfolding sequence of materiality judgments and error correction decisions.

We find that several materiality considerations cited in the authoritative guidance predict the chosen error correction approach. These include the (scaled) error magnitude, the presence of other identified errors, and the importance of leasing activities to firm operations. Our results thus support the notion that materiality judgments reflect both quantitative and qualitative considerations (as suggested in SAB No. 99) rather than simple rules of thumb, e.g., 5 percent of net income. Net income is, however, the dominant quantitative benchmark for explaining error correction decisions in our study, not sales or total assets. This result corroborates earlier research that documents the importance of earnings as a materiality benchmark, but is inconsistent with SEC guidance on the use of a revenue benchmark for determining when to disclose lease rent expense.

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[1] We use the term "error" to refer to these lease accounting misstatements and remain agnostic about whether financial statements were intentionally misstated.

[2] For example, the Financial Accounting Standards Board (FASB) in Statement of Financial Accounting Concepts No. 2 defines materiality as: "The magnitude of an omission or misstatement of accounting information that, in the light of surrounding circumstances, makes it probable that the judgment of a reasonable person relying on the information would have been changed or influenced by the omission or misstatement" (FASB 1980, 10). Other authoritative pronouncements pertinent to materiality judgments are described later in the paper. See Heitzman et al. (2007) for additional discussion of the historical origins of the materiality concept in accounting and auditing practice.

[3] These reforms are discussed in CIFR's final report dated August 1, 2008 which can be found at http://www.sec.gov/about/offices/oca/acifr/acifr-finalreport.pdf.

Although authoritative materiality guidance influences error correction decisions, we find that one other factor may also play a major role. Firms' materiality assessments are associated with the prior actions of other firms. In particular, restatement appears *less likely* when other firms have already used catch-up adjustments to correct larger errors or when relatively few firms have used restatement to correct smaller errors. We also find that clerical considerations, but not strategic considerations, influence the timing of firms' error correction announcements.

This study contributes to the extant materiality literature in three ways. First, while other archival studies of materiality focus on gains, expenses, or contingent liabilities, we investigate the materiality of accounting errors. Much of the authoritative guidance on materiality (e.g., SAB No. 99) focuses on accounting errors, so it is important to test whether the materiality considerations outlined in the guidance are used in practice. Assessing the materiality of an accounting error is a crucial audit process step because error correction decisions presumably affect financial statement informativeness and credibility. Second, our study investigates the influence of several quantitative and qualitative materiality considerations cited in authoritative pronouncements. In contrast, prior studies tend to focus on quantitative materiality considerations and the question of which benchmark (assets, sales, or earnings) best predicts whether the item will be deemed material. Finally, the study provides evidence on whether the actions of other firms influence materiality assessments. The possibility that firms base materiality decisions on those of other firms has implications for disclosure regulation.

The lease accounting errors that underlie our sample and pertinent institutional details regarding the financial reporting choices firms could make are described in Section II. Section III presents our hypotheses. Sample selection procedures, measurement issues, and descriptive statistics are discussed in Section IV. Section V reports our findings and Section VI offers concluding remarks.

II. BACKGROUND

> When it comes to bookkeeping snafus, lease accounting may be the new revenue recognition.
>
> —D. Gullapalli, *Wall Street Journal* (April 20, 2005)

In November 2004, Emeritus Corporation and CKE Restaurants both announced accounting restatements to correct improperly recognized rent expense and other operating lease accounting errors uncovered by their auditor, KPMG. Financial press articles described the Emeritus restatement as a $15 million after-tax error correction and the CKE Restaurants restatement as nearly $46 million, a figure that included several small non-lease errors. By June 2005, more than 250 U.S. firms disclosed lease accounting errors similar to those uncovered at Emeritus and CKE Restaurants. While many of the firms involved restated previously issued financial statements, others apparently considered their errors immaterial and opted instead to record a current-period catch-up adjustment. Telephone and Data Systems, Inc. (TDS) and Target Corporation (clients of PricewaterhouseCoopers and Ernst & Young, respectively) were the first to avoid restatement when in November 2004 they corrected lease accounting errors totaling $3.4 and $10.8 million, respectively. Hyatt and Reed (2007) provide a detailed history surrounding the lease accounting errors, including financial press reaction to their discovery and correction.

The operating lease contracts in question typically involved land on which the tenant firm would construct a leasehold improvement such as a retail store or restaurant. Three areas of improper lease accounting were uncovered. First, firms incorrectly amortized leasehold improvements over a term that included possible future renewals even though renewal was not reasonably assured. Statement of Financial Accounting Standards (SFAS) No. 13 prohibits firms from extending the amortization period beyond the initial lease term when renewal is not reasonably assured. Second, firms incorrectly failed to record rent expense during so-called "rent holidays" when rental payments are not required because, for example, the leasehold improvement is under construction or in a pre-opening phase. FASB Technical Bulletins (FTBs) 85-3 and 88-1 require rent expense to be recorded ratably over all periods of an operating lease even if cash payments are contractually deferred. Third, firms misclassified landlord incentives, i.e., an upfront payment by the landlord that offsets a portion of the tenant's cost of leasehold improvements. Some firms incorrectly recorded the landlord payment as a reduction to property, plant, and equipment rather than as deferred rent as required by FTB 88-1. This error reduced future depreciation expense, whereas the correct treatment would have reduced future rent expense.[4]

Additional regulatory guidance was provided in 2005. In February, the Securities and Exchange Commission (SEC) issued a letter reiterating existing GAAP and clarifying its views on the accounting issues. Then in October, the Financial Accounting Standards Board (FASB) provided further guidance (Staff Position 13-1) on proper accounting for postponement of rent expense during a construction period.

Correction of Accounting Errors

GAAP requires that material errors in previously issued financial reports be corrected by means of a formal restatement.[5] Strict rules govern public disclosure of errors corrected via restatement.[6] Firms that restate past financial statements must first disclose the error and impending restatement in a Form 8-K (Current Events) filing. Although not required by GAAP or the SEC, most restating firms also issue one or more press releases that describe the error and its impact on past financial statements. The restatement process then culminates in the issuance of amended annual or quarterly financial statements for the affected prior periods.

By contrast, accounting errors deemed immaterial may be corrected by restatement of past financial statements or by means of a catch-up adjustment to current-period financial statements.[7] Disclosure of the error is more circumspect when correction occurs through a current-period catch-up adjustment. A Form 8-K filing is not required nor does the firm issue amended prior period financial statements. Instead, disclosure occurs (if at all) in the current quarterly or annual financial statement or as part of a routine earnings press release. The following excerpt typifies the limited disclosure made by non-restatement firms when correcting their lease accounting errors:

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[4] For more information, see SFAS No. 13, *Accounting for Leases*, FTB 85-3, *Accounting for Operating Leases with Scheduled Rent Increases* and FTB 88-1, *Issues Relating to Accounting for Leases*. Other pronouncements on lease accounting include: SFAS No. 98, *Accounting for Leases* and FASB Staff Position (FSP) 13-1 *Accounting for Rental Costs Incurred during a Construction Period*. FSP 13-1 is effective for fiscal periods beginning after December 15, 2005.

[5] See Accounting Principles Board Opinion No. 20 and SFAS No. 154 (issued in May 2005) among others. The SEC has ruled that "there is a duty to correct statements made in any filing ... if the statements either have become inaccurate by virtue of subsequent events or are later discovered to have been false or misleading from the outset, and the issuer knows or should know that persons are continuing to rely on all or any material portion of the statements" (Sec. Act. Rel. 6084, 17 SEC Dock. 1048, 1054 1979).

[6] See Turner and Weirich (2006) and the requirements for Item 4.02 of SEC Release No. 33-8400, *Additional Form 8-K Disclosure Requirements and Acceleration of Filing Date*, effective August 23, 2004.

[7] From a bookkeeping perspective, the distinction between a restatement and a current-period catch-up adjustment is that the restatement corrects the accounting error by altering the beginning-of-period balance in Retained Earnings, whereas the catch-up adjustment does not.

> Like many companies in the retail industry, we recently reviewed our lease accounting policies. This review revealed that we should synchronize the assumptions used to calculate our straight-line rent expense and to estimate useful lives for leased assets. This synchronization resulted in an earnings adjustment of $42 million in the 2004 fourth quarter, of which $36 million corrects prior years. This adjustment has no cash flow effect and includes $26 million for non-cash rent and $16 million for depreciation. (May Department Stores 2005)

The catch-up adjustment at May Department Stores involved a $42 million reduction to 2004 fourth quarter earnings. If the company instead restated prior period financial statements, then the correcting entry would require a $42 million correction for prior periods booked as a reduction to the opening fourth quarter 2004 balance of retained earnings. Restated financial statements for prior fiscal years and the first three quarters of fiscal 2004 would then be issued as amended SEC filings.

Restatement calls attention to the existence and severity of an accounting error. Restatement may also entail legal liability for management and auditors because it constitutes *de facto* admission that previously issued financial statements contained misstatements (Kellogg 1984; Francis et al. 1994). Further, financial statement credibility may be reduced if the disclosed error raises questions within the investment community about management integrity, internal control weaknesses, audit committee oversight, auditor independence, and so on. Catch-up adjustments, on the other hand, entail less stringent disclosure requirements and thus may avoid the negative publicity that often accompanies restatement (Palmrose et al. 2004). Moreover, use of the catch-up adjustment approach implies that management and auditors have judged the accounting error to be immaterial.

Materiality Judgments

The accounting and auditing guidance for materiality assessment does not provide bright-line rules for determining if a specific accounting error is material. Standard-setters have instead opted to view materiality as a matter of professional judgment and to identify both qualitative and quantitative factors relevant to the decision.[8]

Quantitative materiality assessments gauge the magnitude of the accounting error and are made by comparing error magnitude to revenues, gross profit, pretax and net income, total assets, stockholders' equity, or individual line items in the financial statement.[9] Although quantitative thresholds such as 5 percent of net income have long been used in practice (Nelson et al. 2005), the SEC (SAB No. 99) and Public Company Accounting

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[8] For examples of such discussions see Statement of Financial Accounting Concepts No. 2, Staff Accounting Bulletin (SAB) No. 99, and the Auditing Standards Board's Interpretations of AU Section 312, *Audit Risk and Materiality.*

[9] Two alternative approaches are used in practice to quantify materiality. The *cumulative* approach compares the total amount of misstatement existing at the end of the period (i.e., the amount needed to correct the balance sheet) to net income or some other benchmark. By contrast, the *current-period* approach compares the incremental amount of misstatement added in the period to net income or other benchmark. There is no requirement for either management or the auditor to disclose externally which approach is applied, and voluntary disclosure is nonexistent (Nelson et al. 2005). SAB No. 108, issued by the SEC in September 2006, now requires companies to use both methods.

Oversight Board (PCAOB AU Sec. 312) stress the importance of both qualitative and quantitative materiality considerations. The SEC, for example, cautions against the use of quantitative "rules of thumb" for materiality assessment because exclusive reliance on percentage or numerical thresholds has no basis in the accounting literature or the law:

> Quantifying, in percentage terms, the magnitude of a misstatement is only the beginning of an analysis of materiality; it cannot appropriately be used as a substitute for a full analysis of all relevant considerations. (SAB No. 99, SEC 1999 ¶2)[10]

SAB No. 99 (SEC 1999) identifies several qualitative considerations pertinent to assessing the materiality of an accounting error. These include whether the error masks a change in earnings or other trends; hides a failure to meet Wall Street analysts' consensus sales or earnings forecasts; changes a loss into profit; increases management compensation; affects compliance with loan covenants, contracts, or regulatory requirements; involves concealment of an unlawful transaction; and whether management or the outside auditor expects that the known error may result in a significant positive or negative stock market reaction. How much weight these considerations should be given is left unspecified.

Because GAAP does not provide bright-line rules for determining materiality, management and auditors must jointly negotiate a subjectively determined (but unobservable) materiality assessment on a case-by-case basis. This approach leaves open the possibility that some assessments are opportunistic and designed to achieve financial reporting and disclosure goals. This might occur, for example, when SAB No. 99 qualitative factors are used to justify *ex post* the materiality determination or when the judgment is influenced by contextual considerations beyond those identified in regulatory guidelines.

Prior Research

There is an extensive archival and experimental literature on whether auditors' materiality judgments reflect simple income statement and balance sheet thresholds (see Holstrum and Messier 1982; Chewning et al. 1989; Messier et al. 2005; Nelson 2005).[11] In general, this literature highlights the importance of the error amount relative to net income as a determinant of materiality, with additional evidence that materiality decisions are sometimes affected by the error amount relative to gross or net assets. Auditors are more likely to waive correction of a detected error when the amount is small, current-period-income decreasing, or subjectively determined (e.g., Braun 2001; Nelson 2003; Nelson et al. 2005). Even when the error amount is objective, auditors do not expect management to make a full correction if doing so would cause the firm to fall short of analysts' consensus earnings forecasts (Libby and Kinney 2000). Auditors are more likely to require correction of errors in recognized amounts than in the equivalent footnote amounts (Libby et al. 2006). Auditors' materiality judgments are also sensitive to client importance, client preferences, and client pressure (e.g., Beeler and Hunton 2002; Libby and Kinney 2000; Nelson et al. 2002).

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[10] The SEC continues to oppose providing explicit quantitative "rules of thumb" for materiality assessments despite recent requests to do so from the Committee on Capital Markets Regulation (CCMR) and other groups. The CCMR expressed hope that the SEC or PCAOB would use the issuance of Auditing Standard No. 5—approved in July 2007—as an opportunity to provide more detailed quantitative materiality guidance (Johnson 2007). See the CCMR comment letter to the PCAOB at http://www.capmktsreg.org/pdfs/Committee_PCAOB_404_Comment_2.26.pdf.

[11] Excellent summaries of early archival and experimental research on materiality thresholds and judgments are available in Holstrum and Messier (1982) and Chewning et al. (1989). An updated review is provided in Messier et al. (2005).

Closely related to our study is the archival research on materiality and disclosure choice. This research finds a positive association between item magnitude (i.e., quantitative materiality) and the likelihood of disclosing accounting policy consistency exceptions (Morris and Nichols 1988), retiree healthcare costs (Liu and Mittelstaedt 2002), or a contingent liability (Fesler and Hagler 1989; Gleason and Mills 2002).[12] Income statement classification decisions in equity-for-debt swap transactions also seem to closely follow rules of thumb based on quantitative materiality considerations (Chewning et al. 1998).[13,14] Quantitative materiality assessments alone do not, however, fully explain firms' disclosure choices in these settings. Liu and Mittelstaedt (2002), for example, find that profitability, ownership concentration, and firm size influence the decision to disclose retiree health care costs. Gleason and Mills (2002) find that contingent liability disclosure decisions are affected by whether firms' are issuing equity or operate in a litigious industry.

We extend earlier archival research on materiality using a sample of accounting errors made after promulgation of SAB No. 99 guidelines in 1999. Given the emphasis placed on accounting errors in the authoritative guidance on materiality, it is important to test whether the considerations outlined in SAB No. 99 are used in practice. We also differ from prior studies in that we test conjectures about both quantitative and qualitative materiality considerations.

A limiting feature of most archival research on materiality and financial reporting decisions is that amounts deemed immaterial by management and auditors are not typically revealed outside the firm. As a result, researchers must instead estimate the undisclosed (and thus unobservable) immaterial item amount. Any measurement error introduced by the researcher's estimation process can either mask a true underlying correlation or introduce spurious correlation with the variables of interest.[15] Our study avoids this problem because firms retained in the sample provide financial statement narrative disclosure of the presumably immaterial amounts of catch-up adjustments made to correct their lease accounting errors. Our setting is also unique in that we can investigate how materiality assessments are influenced by the prior corrective actions of other firms that uncover similar accounting errors.

III. RESEARCH QUESTIONS

Materiality considerations are likely to be the dominant influence behind the decision to correct operating lease accounting errors using restatement because prevailing professional standards require restatement if the error is deemed material. Incentives common to the voluntary disclosure literature (e.g., litigation risk) may also play a role in error correction decisions but are likely to be of secondary importance. We accordingly develop predictions about the quantitative and qualitative determinants of materiality judgments applicable to this research setting. These materiality predictions form the basis for our initial model of the financial reporting choice—restatement versus catch-up adjustment. Next, we augment the materiality predictions by incorporating other considerations that are likely to favor one correction approach over the other.

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[12] For example, Morris and Nichols (1988) find that the materiality decisions embedded in auditors' interest-capitalization consistency exceptions are associated with net income and other financial variables, these associations vary across audit firms, and these differences are partially explained by differences in audit methodologies—unstructured versus highly structured.

[13] Equity-for-debt swaps were popular in the early 1980s and enabled firms to retire debt in a tax advantageous way by issuing stock. The transactions usually (but not always) produced a "gain on early retirement of debt" for the swap firm. SFAS No. 4 requires such gains to be classified as extraordinary income if material and as "other income" if immaterial. The gain amount was typically disclosed in the financial statement footnotes.

[14] Evidence obtained directly from audit engagement work papers confirms that the importance of quantitative considerations to materiality assessments involving accounting errors (Iceman and Hillison 1991; Wright and Wright 1997) but these studies predate the SAB No. 99 qualitative guidelines.

[15] See Heitzman et al. (2007) for a related discussion regarding materiality, observability, and voluntary disclosure research.

Quantitative Materiality Considerations

The likelihood of formal restatement is predicted to increase with the magnitude of the error. This prediction follows from prevailing quantitative guidelines: the larger the error, the more likely it is to be deemed material by management and outside auditors. The financial statement benchmark for quantifying materiality in this setting may not be net income or assets, however. SEC registrant firms are required to separately disclose lease rent expense when gross rents exceed 1 percent of revenue (SEC 1973). Whether firms use revenue, assets, net income, or "normal" income as the benchmark for quantifying the materiality of their lease accounting errors is thus an empirical question.[16]

Qualitative Materiality Considerations

Prevailing guidelines dictate that even small accounting errors may be deemed material based on qualitative factors and the circumstances of misstatement. Accordingly, we investigate the influence on materiality judgments of qualitative factors identified in SAB No. 99. Consistent with SAB No. 99's emphasis on "importance to operations" as a qualitative materiality consideration, the likelihood of restatement is predicted to increase in operating lease intensity. SAB No. 99 also states that the effect of the misstatement on the sign and trend of earnings should be considered. Thus, we predict a greater likelihood of restatement when the alternative error correction approach (i.e., catch-up adjustment) would disrupt the quarterly earnings trend or create a quarterly loss. This prediction is consistent with the view (Burgstahler and Dichev 1997; Degeorge et al. 1999) that managers prefer restatement if it allows the firm to meet these important earnings benchmarks and the catch-up adjustment would instead cause the firm to fall short.[17]

High levels of financial leverage exacerbate agency conflicts that arise naturally between owners and creditors (Jensen and Meckling 1976). Debt covenants—including those tied to financial statement figures—constrain the ability of shareholders and managers to expropriate creditor wealth. Covenants tend to become more stringent as leverage increases. Consistent with SAB No. 99's inclusion of loan covenant compliance as a qualitative material consideration, the likelihood of restatement is predicted to be increasing in financial leverage.

The likelihood of restatement is also predicted to increase in the presence of other (non-lease-related) accounting errors. Such errors add to the severity of the accounting misstatement and thus increase the likelihood that the aggregate error will be deemed material.

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[16] "Normal" income is defined by Gleason and Mills (2002) as the greater of annual net income or 5 percent of total assets. We adapt their approach to our setting and use the maximum of four times quarterly net income or 5 percent or total assets at the beginning of the quarter.

[17] We do not investigate whether catch-up adjustments would cause a firm to miss analyst forecasts because unusual or nonrecurring items may be excluded from these forecasts (Gu and Chen 2004).

Contextual Considerations

Factors beyond those mentioned in the professional literature may also influence materiality assessments and thus the decision to correct lease accounting errors using restatement or catch-up adjustment. In particular, we suspect that materiality judgments in this setting will reflect a form of herding behavior (Banerjee 1992; Bikhchandani et al. 1992) where subjective thresholds become less tied to managers' and auditors' private information and instead are influenced by the choices other firms have already made.[18] Specifically, the likelihood of restatement is predicted to increase with the number of previously announced smaller restatements and to decrease with the number of prior larger catch-up adjustments. The intuition behind this prediction is that frequent smaller restatements serve as a justification for reducing the subjective materiality threshold negotiated by managers and auditors. Frequent larger catch-up adjustments, on the other hand, provide a convenient excuse for why restatement is not required and thus serve to raise the subjective materiality threshold.

There is another way in which other firms' prior actions may influence materiality judgments. Comparatively low subjective thresholds may be used in gauging the materiality of accounting errors that are isolated events because idiosyncratic errors are indicative of weak financial reporting and control processes. By contrast, higher thresholds may be used once it becomes clear that the error is pervasive in an industry and thus can be blamed on widespread confusion about the relevant accounting standards. To investigate this issue, we test whether materiality thresholds change over time as more firms disclose errors or after the SEC issues its letter instructing firms to correct their lease accounting errors.

We use growth opportunities and financial distress to proxy for litigation risk, and predict that the likelihood of restatement decreases with litigation risk. High-growth opportunity firms experience a larger share price decline in response to negative earnings news than do low-growth opportunity firms (Skinner and Sloan 2002). Large share price declines are also associated with an increased probability that shareholder class action and derivative suits will be filed. Managers and auditors who fear that formal restatement might trigger a share price decline may prefer the less visible catch-up adjustment to reduce their perceived exposure to litigation risk. A similar argument motivates our conjecture about financial distress. In addition, Braun (2001) finds that auditors are more likely to waive error correction when the client is in good financial health.[19]

We also investigate whether error correction decisions are affected by a recent restatement, low earnings quality, auditor membership in the Big 4, or firm size. We conjecture that recent restatement firms prefer to avoid the potentially negative financial press coverage that may accompany another restatement and so are likely to instead opt for a catch-up adjustment. Restatement is also predicted to be less likely among firms with low-quality earnings.[20] Firms with low-quality earnings are conjectured to prefer the less visible catch-up adjustment approach and thus avoid attracting investor or analyst attention to their other accounting practices. We do not make directional predictions about the effects of Big 4 auditor and firm size on the likelihood of restatement but include these variables as controls because they are common to the literature.[21]

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[18] Herding may be inefficient in this setting if an error that would have been deemed material is instead inappropriately judged immaterial based on the pattern of correction decisions made by other firms.

[19] We do not adopt the "litigious industry members" approach used in Gleason and Mills (2002) and elsewhere because only 12 firms in our sample operate in such industries.

[20] In addition to aggregating errors that have been detected, auditors must consider the possibility that other errors remain undetected when they estimate the "aggregate likely misstatement" amount (SAS No. 47, 30). If low earnings quality is a proxy for undetected errors, then it may well be associated with an increased likelihood of formal restatement.

Timing of Error Correction Announcements

A unique feature of this research setting is that it affords us an opportunity to test conjectures about factors that may influence the timing of firms' error correction announcements. It takes time for a firm to determine the scope and magnitude of its lease accounting errors, and to assemble the information needed for error correction. Clerical aspects of the error correction process are thus predicted to influence the timing of firms' announcements. Lease intensity proxies for the scope of the firm's internal accounting investigation. Firms that rely heavily on operating leases are predicted to delay announcement because numerous individual lease contracts must be examined. Error magnitude and the presence of other accounting errors both proxy for investigation complexity, which is predicted to result in announcement delay. Firm size, on the other hand, is predicted to be negatively related to announcement delays because size proxies for available internal resources that can be deployed to speed up the investigation and accelerate announcement. Announcement delays are also predicted to be less likely when the firm's SEC filing deadline is near rather than distant.

Strategic considerations may also influence the timing of firms' error correction announcement decisions. For example, firms opting for a catch-up adjustment are predicted to avoid recording the adjustment in a quarter when the correction would transform a profit into a loss or produce a decline in year-over-year earnings. Neither factor should influence the timing of announcements for restatement firms. Firms that prefer to quietly correct by means of catch-up adjustments may delay announcement until the actions of other firms provide an "excuse" for the financial reporting choice. Such excuses are provided when few other firms have announced smaller restatement corrections while many other firms have announced larger catch-up adjustment corrections.

IV. DATA AND METHODS

Sample Selection Procedures and Sample Statistics

Our preliminary sample is from *Analysts' Accounting Observer*, an investment newsletter that published a list of U.S. firms disclosing lease accounting errors from November 2004 through April 2005. The sample is augmented by firms identified from electronic text queries of wire service press releases and SEC filings spanning the period from August 2004 through August 2006.[22] The pertinent SEC filings and press releases of each potential sample firm are reviewed to confirm the discovery of an error in the accounting for operating leases. We discard firms if the dollar amount of the error is indeterminate, the error involves capital leases or lessor revenue recognition but not lessee operating lease accounting, or the firm also discloses pervasive financial statement errors or irregularities unrelated to operating leases. The final sample is comprised of 244 firms with data available on Compustat, of which 115 (47.1 percent) are retail firms and 41 (16.8 percent) are restaurant chains. Of the total sample, 150 firms (61.5 percent) use restatement to correct their lease accounting errors and the remaining 94 firms (38.5 percent) use a catch-up adjustment. The first lease accounting error in our sample was uncovered at Telephone and Data Systems (TDS) and disclosed on November 9, 2004.[23]

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[21] Gleason and Mills (2002) find that firm size is unrelated to materiality judgments, but Costigan and Simon (1995) find that firm size does influence auditors' willingness to modify the audit opinion for inconsistencies in the application of accounting principles.

[22] The text query strings identified business press releases or SEC filings containing variations of the terms "lease" or "rent" in close proximity to "accounting" and to variations of "correction," "adjustment," "review," "revision," "error," "adoption," "change," "13-1," or "restate."

Table 1 provides descriptive information on the magnitude and timing of the lease accounting error corrections comprising our sample. Among firms that use restatement, the mean dollar error is $13.3 million. This dollar amount represents 1.2 percent of annual sales, 1.1 percent of assets, 32.4 percent of previous year net income, and 38.4 percent of "annualized" quarterly net income in the correction quarter.[24] By contrast, the mean dollar error is only $6.1 million among firms that use a catch-up adjustment. This smaller error is 0.5 percent of annual sales, 0.3 percent of assets, 4.0 percent of prior year net income, and 4.6 percent of "annualized" quarterly income in the correction quarter. Restatements tend to be announced earlier in the sample period than catch-up adjustments. The median number of previously announced error corrections is 107 for restatements and 146 for catch-up adjustments.

Figure 1 provides additional descriptive information about the timing and magnitude of the lease accounting errors in our sample. Panel A depicts the relative frequency of errors disclosed each week between November 2004 and June 2006 grouped by accounting treatment (Restatement or Catch-Up Adjustment). Each column in the figure shows the proportion of restatement (or catch-up) sample firms that disclosed the correction of lease accounting errors in a given calendar week. Key dates are also shown. There are two significant features of the data in Panel A. First, there is substantial cross-sectional variation in the timing of error correction disclosure within each accounting treatment group. Second, there is also considerable overlap in the two frequency distributions.

Panel B of Figure 1 compares the scaled magnitude of the lease accounting errors across the two accounting treatment groups (Restatement or Catch-Up Adjustment). Each column shows the proportion of restatement (or catch-up adjustment) sample firms assigned to one of 47 error magnitude bins that range from −5 percent to 41 percent. Error magnitude is the dollar amount of the error correction, divided by the absolute value of "annualized" quarterly net income for the quarter in which the error is corrected. This approach is used so that error magnitude is displayed relative to the familiar "5 percent of net income" rule of thumb. Observations that fall outside the range of −5 percent to 41 percent are grouped in the far left or right bin, respectively. There are several noteworthy features of the data. First, errors corrected by means of restatement tend to be larger than those corrected using catch-up adjustments. This feature is consistent with the quantitative guidelines found in the professional literature and the descriptive statistics in Table 1. Second, more than one-third of the restatements correct errors smaller than 5 percent of annualized quarterly net income. This feature is consistent with firms' use of some other denominator benchmark for quantifying materiality (e.g., revenue) or the use of qualitative considerations described in the professional literature. The most noteworthy feature of the data, however, is that many errors corrected via restatement are smaller than those corrected via catch-up adjustment.

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[23] The November 2004 lease error restatements by Emeritus Corporation and CKE Restaurants described in Section II do not survive our sample selection criteria. The term "stealth restatement" is used by the financial press to refer to certain prior period error corrections booked as restatements and disclosed as such in current-period financial statements but without the requisite 8-K and amended 10-Q or 10-K filings (Reilly 2006). Sample observations with these characteristics are assigned to the "restatement" group in our study because the financial statements recast past reported amounts and label the revised figures as "restated" amounts. Past financial statements are not recast when firms use a current-period catch-up adjustment to correct accounting errors.

[24] "Annualized" quarterly net income is adjusted to eliminate any current-period component of the error correction, and then multiplied by 4 to approximate annual earnings. The absolute value of quarterly net income is used to preserve the sign of the accounting error (numerator) in the presence of quarterly losses (denominator).

TABLE 1
Descriptive Statistics on Lease Accounting Error Corrections

	Formal Restatement (n = 150)				Catch-Up Adjustments (n = 94)				
	Mean	**Q1**	**Median**	**Q3**	**Mean**	**Q1**	**Median**	**Q3**	**t-test Significance**
Magnitude of accounting error (overstatement of past earnings)									
$ millions	13.283	1.316	3.586	10.711	6.137	0.480	1.365	4.800	***
Scaled by:									
Annual net income (*ERR_ANI*)	0.324	0.061	0.119	0.260	0.040	0.011	0.027	0.047	***
Quarterly net income (*ERR_QNI*)	0.384	0.034	0.074	0.246	0.046	0.007	0.016	0.031	***
Normalized quarterly net income (*ERR_NQNI*)	0.170	0.030	0.060	0.185	0.032	0.007	0.014	0.025	***
Annual sales (*ERR_ASALES*)	0.012	0.002	0.005	0.009	0.005	0.000	0.001	0.003	**
Quarterly sales (*ERR_QSALES*)	0.011	0.002	0.003	0.008	0.004	0.000	0.001	0.002	**
Total assets (*ERR_TA*)	0.011	0.003	0.007	0.013	0.003	0.001	0.001	0.003	***
Timing of error correction disclosure									
Number of announcements since the first correction	111	56	107	169	134	56	146	196	**
Firms with fiscal years ending Nov–Feb									
% that correct errors in fiscal 2004, Q3 financial statements	0.7%				2.1%				
% that correct errors in fiscal 2004, Q4 financial statements	70.0%				62.7%				
% that correct errors in fiscal 2005, Q1 financial statements	4.0%				4.3%				
% that correct errors in fiscal 2005, Q2 financial statements	1.3%				4.3%				
% announce in subsequent quarter	2.7%				4.3%				
Firms with fiscal years not ending Nov–Feb	21.3%				22.3%				
Total	**100.0%**				**100.0%**				

(*continued on next page*)

TABLE 1 (continued)

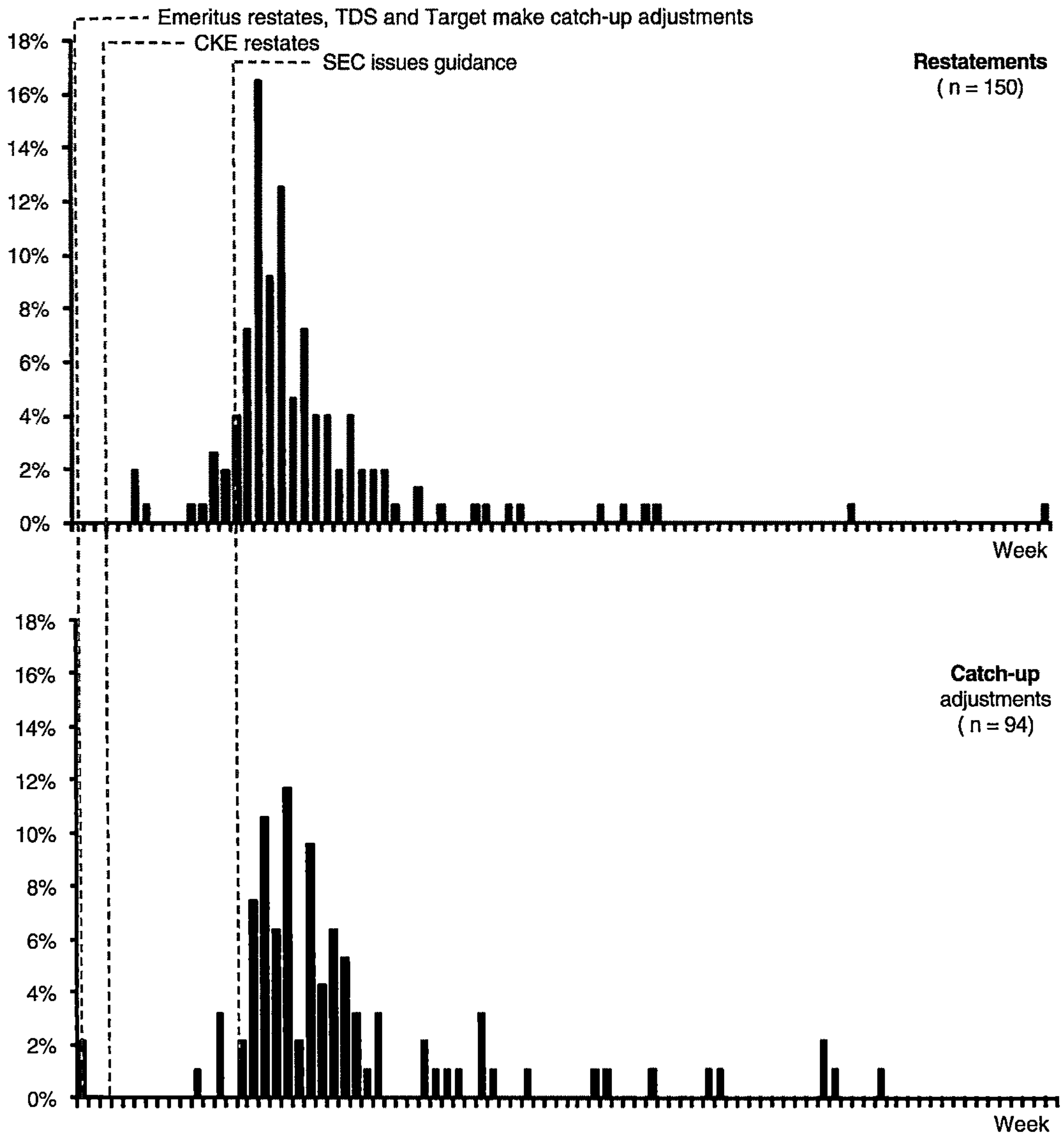
	Formal Restatement (n = 150)				Catch-Up Adjustments (n = 94)				
	Mean	**Q1**	**Median**	**Q3**	**Mean**	**Q1**	**Median**	**Q3**	**t-test Significance**
Other Firm Characteristics									
Operating lease intensity (*LEASE*)	0.853	0.328	0.739	1.224	0.464	0.123	0.340	0.725	***
Log of total assets (*SIZE*)	6.411	5.488	6.429	7.412	7.157	5.926	7.131	8.532	***
% Big Four auditor (*BIG4*)	90.0%				91.5%				
% of firms correcting errors in addition to leases (*ERR_OTHR*)	24.0%				3.2%				***
Magnitude of additional errors scaled by net income (conditional on announcing additional errors)	−1.126	0.000	0.000	0.040	−0.003	0.018	−0.002	−0.029	

Significance levels for between-sample test of mean equality are denoted as ***, **, and * for rejection at the 0.01, 0.05, and 0.10 levels, respectively.

This table shows the magnitude and timing of 244 lease accounting errors disclosed between November 2004 and June 2006 grouped by accounting treatment (Restatement or Catch-Up Adjustment). A positive error denotes the overstatement of past earnings. The first error in our sample was disclosed by Telephone and Data Systems on November 9, 2004. Annual net income (NI) and sales are from the most recent fiscal year ended prior to the correction quarter. Quarterly NI and sales are from the correction quarter and multiplied by 4 to approximate annual values. Variables using NI are adjusted to eliminate any current period component of the error correction. The absolute value of NI is used to preserve the sign of the accounting error (numerator) in the presence of losses (denominator). "Normalized" quarterly NI equals the greater of adjusted "annualized" quarterly NI or 5 percent of assets.

FIGURE 1
The Frequency and Magnitude of Lease Accounting Errors

Panel A: Frequency of Lease Accounting Errors Expressed as a Percentage of the Sample

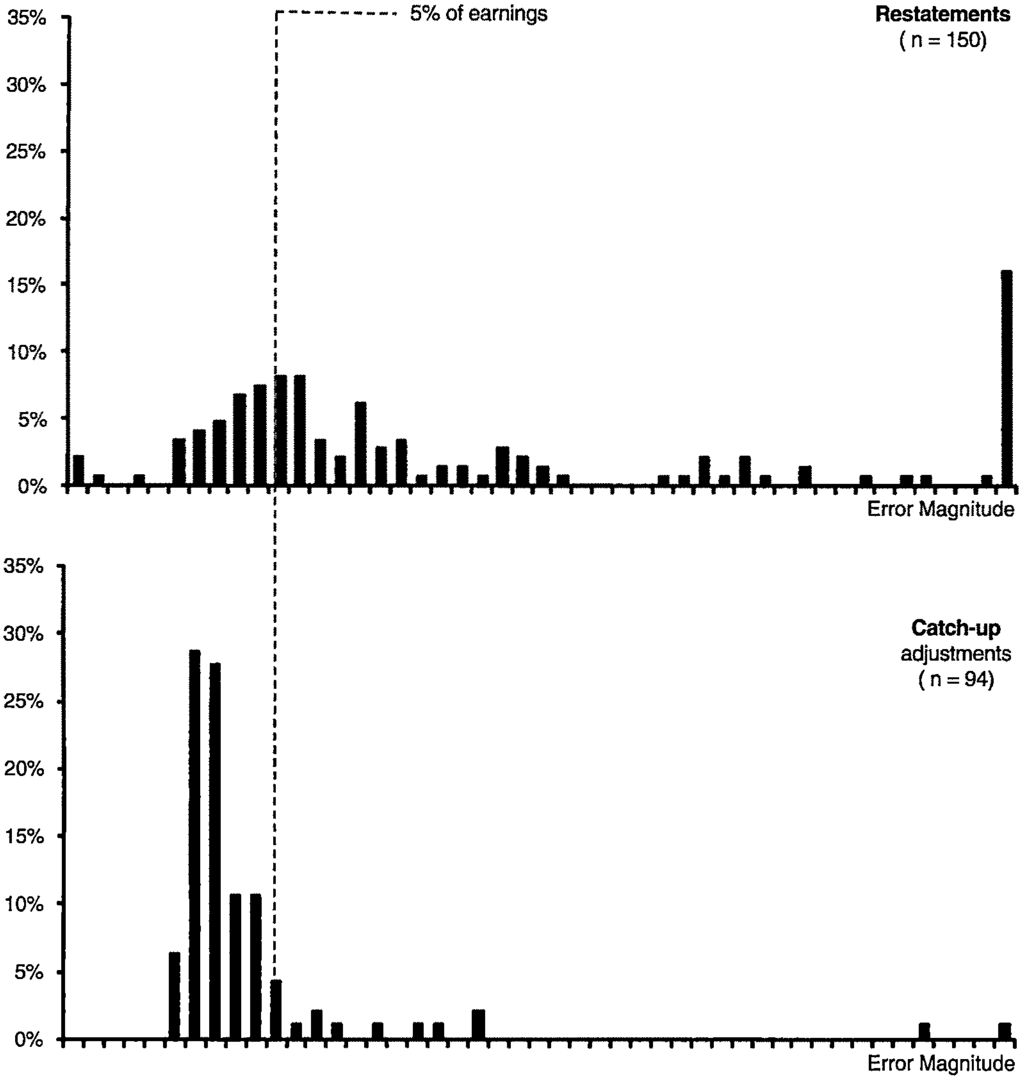


This panel describes the relative frequency of lease accounting errors disclosed each week between November 2004 and June 2006 grouped according to accounting treatment (Restatement or Catch-Up Adjustment) for the 244 errors in our sample. Each column in the figure represents the proportion of sample firms that disclosed the correction of lease accounting errors in a given calendar week.

(*continued on next page*)

FIGURE 1 (continued)

Panel B: Magnitude of Lease Accounting Errors



This panel shows the relative frequency of lease accounting errors assigned to each of 47 error magnitude bins that range from –5 percent to 41 percent. Error magnitude is calculated as the dollar amount of the error (Restatement or Catch-Up Adjustment), divided by the absolute value of "annualized" quarterly net income for the quarter in which the error is corrected. Quarterly net income is adjusted to eliminate any current period component of the error correction, and then multiplied by 4 to approximate annual earnings. Absolute value of quarterly net income is used to preserve the sign of the accounting error (numerator) in the presence of quarterly losses (denominator). Each column in the figure represents the proportion of restatement (or catch-up adjustment) sample firms in a given error magnitude bin. Observations outside the range of –5 percent to 41 percent have been grouped in the far left or right bin, respectively.

Estimating the Probability of Restatement

To isolate the influence of quantitative and qualitative materiality considerations and contextual factors on firms' accounting error correction decisions, we estimate a logistic regression of a binary variable denoting restatement ($RESTATE = 1$ or 0) on explanatory variables conjectured to predict the accounting choice. The estimation equation has the following general form: $\ln \frac{P_{Restate}}{1 - P_{Restate}} = \alpha + \beta X + \varepsilon$ where $\ln \frac{P_{Restate}}{1 - P_{Restate}}$ is the logged odds that restatement is used to correct the errors, and $\beta X = \beta_1 VAR_1 + \beta_2 VAR_2 + \ldots$ is the vector of coefficient estimates and explanatory variables.

Quantitative materiality considerations are captured by the six error magnitude metrics in Table 1. Each metric is the aggregate dollar lease error scaled by one of six financial benchmarks: annual net income (*ERR_ANI*); "annualized" quarterly net income (*ERR_QNI*); normalized quarterly net income (*ERR_NQNI*); annual sales (*ERR_ASALES*); quarterly sales (*ERR_QSALES*); or total assets (*ERR_TA*).[25] Operational definitions for these and other variables appear in the Appendix. The analysis isolates the aggregate and incremental contribution of each quantitative materiality metric to the probability of restatement. We predict a positive logit coefficient estimate for each individual metric but have no *a priori* opinion about which of the six quantitative materiality measures will be most influential.

Qualitative materiality considerations are captured by: operating lease intensity (*LEASE*); financial leverage (*LVRG*); catch-up adjustments that would either transform a quarterly profit into a *LOSS* or produce a *DECLINE* in year-over-year quarterly earnings; and by the firms' discovery of other accounting errors (*ERR_OTHR*). We predict that a positive coefficient estimate will be associated with each qualitative materiality variable.

The first of our contextual factors captures the influence that other firms' actions may have on subjective materiality thresholds and error correction decision. For each sample observation, we count the number of firms that have already announced larger catch-up adjustments (denoted *LC*) or smaller restatements (denoted *SR*) using as a benchmark the error magnitude scaled by prior year earnings (*ERR_ANI*). We then construct a proportional index ($FAVOR\_C = (1 + LC)/(1 + LC + SR)$) that reflects whether the prior actions of other firms tend to favor catch-up adjustment or restatement. Notice that each firm has a unique *FAVOR_C* value that depends on its own scaled error and on the prior actions of other firms. A negative coefficient estimate is predicted for *FAVOR_C*, consistent with the notion that a history of large catch-up adjustments serves as an excuse for avoiding restatement.

Other contextual factors include: the number of firms that have already announced their corrections (*PRIOR_OBS*); whether the firm announced its correction after the SEC's guidance letter (*SEC_LTR*); whether the firm recently restated for other reasons (*RECENT*); earnings quality as measured by discretionary accruals (*ACCRLS*); financial distress (*Z_SCORE*); growth opportunities measured as the market-to-book ratio (*MTB*); audit firm membership in the Big 4 (*BIG4*); and firm size measured as the natural logarithm of total assets (*SIZE*). These variables are predicted to decrease the likelihood of restatement, except for firm size and *BIG4* where we have no directional prediction about the logit coefficient estimate.

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[25] We also considered scaling the error by annual operating income, but this measure was not predictive of restatement.

Table 2 reports descriptive statistics for the explanatory variables. The data in Panel A show that the average lease error is 21.4 percent of annual net income, 25.4 percent of annualized quarterly net income, 0.8 percent of assets, and almost 1 percent of annual sales. Other accounting errors occur in 16 percent of the sample. Over 10 percent of the errors would result in a quarterly loss if corrected by the catch-up adjustment, and 21 percent would result in a quarterly earnings decline. Recent accounting restatements occur in only 5 percent of the sample, and more than 90 percent of the firms use a Big 4 auditor. It is not surprising that the correlations in Panel B reveal that extreme multicollinearity is present among the quantitative materiality metrics. The remaining explanatory variables are, however, characterized by moderate or low collinearity.

V. RESULTS

Materiality and the Choice of Correction Approach

Table 3 reports the results obtained from estimating a logistic regression model of the likelihood that restatement is used to correct discovered lease accounting errors. Panel A reports evidence on the influence of quantitative materiality considerations; Panel B adds qualitative considerations mentioned in SAB No. 99; and Panel C includes contextual factors hypothesized to influence firms' error correction decisions. Tests for coefficient significance are based on White-corrected standard errors.

The results in Panel A, Table 3 confirm the influence of quantitative materiality considerations on firms' error correction decisions. Two of the six error measures, *ERR_ANI* and *ERR_TA*, exhibit a highly significant positive association with the likelihood of restatement. The association is strongest when the error magnitude is scaled by annual net income (*ERR_ANI*, pseudo-R^2 of 31.6 percent) and weakest when scaled by sales (*ERR_ASALES* and *ERR_QSALES*, pseudo-R^2 of about 3 percent). Results for the combined logistic regression (Model 7) underscore the dominant influence of *ERR_ANI* and *ERR_TA* in our sample because the coefficient estimates associated with both variables remain positive and significant when the other error metrics are added to the model.

Panel B of Table 3 investigates the incremental contribution of qualitative materiality considerations to the error correction decision. *ERR_ANI*, the strongest predictor in Panel A, is the benchmark quantitative materially measure in Panel B. Two qualitative materiality factors, lease intensity (*LEASE*) and other accounting errors (*ERR_OTHR*), exhibit positive and highly significant coefficient estimates. Moreover, adding qualitative variables to the logit regression model increases the pseudo-R^2 to 50.0 percent from 31.6 percent (Panel A).[26]

The inclusion of contextual variables (Panel C, Table 3) yields further improvement in the pseudo-R^2 to 62.3 percent. The coefficient estimate for *FAVOR_C* is negative, as predicted, and highly significant ($p\text{-value} < 0.01$). Two other contextual variables exhibit negative associations with the likelihood of restatement and are marginally significant: the number of prior observations (*PRIOR_OBS*) and abnormal accruals (*ACCRLS*). Interestingly, the inclusion of contextual variables in the logit model renders the lease error magnitude (*ERR_ANI*) insignificant. *FAVOR_C* is solely responsible for this result, and for nearly all of the expanded model's increased explanatory power. For our unique sample of

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[26] A review of the sample firms' audit opinions showed that none of the catch-up adjustments resulted in consistency exceptions. This evidence provides additional support for the notion that firms used catch-up adjustments for errors that were deemed immaterial because the PCAOB (AU Sec. 420) requires the audit opinion to note a consistency exception when comparability is materially affected.

TABLE 2
Descriptive Statistics for Quantitative, Qualitative, and Contextual Variables Hypothesized to Influence Lease Accounting Error Correction Decisions

Panel A: Summary Statistics for Univariate Distributions

Variable	n	Mean	Std. Dev.	Q1	Median	Q3
Quantitative Considerations						
Error magnitude scaled by:						
Annual net income (*ERR_ANI*)	244	0.214	0.552	0.023	0.064	0.156
Quarterly net income (*ERR_QNI*)	244	0.254	0.806	0.015	0.040	0.111
Normalized quarterly net income (*ERR_NQNI*)	244	0.117	0.243	0.012	0.037	0.099
Annual sales (*ERR_ASALES*)	244	0.009	0.028	0.001	0.003	0.007
Quarterly sales (*ERR_QSALES*)	244	0.008	0.025	0.001	0.002	0.006
Total assets (*ERR_TA*)	244	0.008	0.013	0.001	0.004	0.009
Qualitative Considerations						
Presence of other errors (*ERR_OTHR*)	244	0.160	0.367	0.000	0.000	0.000
Operating lease intensity (*LEASE*)	244	0.703	0.604	0.219	0.521	1.053
Financial leverage (*LVRG*)	239	0.223	0.256	0.025	0.151	0.324
"Catch up" would trigger a quarterly loss (*LOSS*)	244	0.102	0.304	0.000	0.000	0.000
or a quarterly earnings decline (*DECLINE*)	244	0.213	0.410	0.000	0.000	0.000
Contextual Considerations						
Prior larger "catch up" adjustment % (*FAVOR_C*)	244	0.412	0.335	0.063	0.365	0.752
Log of number of prior correction (*PRIOR_OBS*)	244	4.489	0.972	4.043	4.779	5.212
Correction made after SEC letter (*SEC_LTR*)	244	0.930	0.255	1.000	1.000	1.000
Recent restatement by this firm (*RECENT*)	244	0.053	0.225	0.000	0.000	0.000
Abnormal accurals over the prior four quarters (*ACCRLS*)	231	−0.275	2.375	−0.047	−0.003	0.047
Financial distress (*Z_SCORE*)	231	4.937	4.028	2.619	4.067	6.314
Market-to-book ratio (*MTB*)	222	3.064	2.628	1.480	2.376	3.595
Audited by a Big 4 firm (*BIG4*)	244	0.906	0.293	1.000	1.000	1.000
Log of firm size (*SIZE*)	244	6.698	1.572	5.627	6.630	7.644

(*continued on next page*)

TABLE 2 (continued)

Panel B: Bivariate Pearson (above diagonal) and Spearman (below diagonal) Correlation Coefficients
Correlation coefficients shown in bold are statistically different from zero at the 0.05 level. Correlation coefficients greater than 0.50 in absolute value are denoted by a shaded background.

	Error magnitude (*ERR*) scaled by																			
Variables	*_ANI*	*_QNI*	*_NQNI*	*_ASALES*	*_QSALES*	*_TA*	*ERR_OTHR*	*LEASE*	*LVRG*	*LOSS*	*DECLINE*	*FAVOR_C*	*PRIOR_OBS*	*SEC_LTR*	*RECENT*	*ACCRLS*	*Z_SCORE*	*MTB*	*BIG4*	*SIZE*
ERR_ANI		**0.23**	**0.43**	**0.13**	**0.13**	**0.45**	**0.15**	**0.21**	0.01	**0.28**	**0.24**	**−0.37**	−0.06	−0.07	**0.18**	0.01	−0.12	**−0.17**	−0.11	**−0.22**
ERR_QNI	**0.78**		**0.47**	**0.23**	**0.25**	**0.42**	−0.02	0.08	0.13	**0.29**	0.12	**−0.25**	−0.11	−0.05	0.01	0.01	**−0.16**	−0.12	−0.05	**−0.13**
ERR_NQNI	**0.81**	**0.89**		**0.63**	**0.64**	**0.96**	0.07	**0.17**	0.10	**0.40**	**0.34**	**−0.34**	**−0.17**	−0.12	**0.13**	**−0.15**	**−0.22**	−0.07	**−0.16**	**−0.30**
ERR_ASALES	**0.74**	**0.73**	**0.85**		**1.00**	**0.61**	−0.05	−0.05	0.14	0.10	**0.24**	**−0.18**	−0.10	−0.01	0.00	**−0.22**	**−0.22**	−0.01	0.01	−0.09
ERR_QSALES	**0.74**	**0.76**	**0.87**	**0.99**		**0.62**	−0.04	−0.05	**0.15**	0.11	**0.24**	**−0.19**	−0.11	−0.02	0.00	**−0.22**	**−0.23**	−0.02	0.01	−0.09
ERR_TA	**0.81**	**0.78**	**0.92**	**0.91**	**0.90**		0.07	**0.22**	0.04	**0.40**	**0.41**	**−0.42**	**−0.21**	**−0.15**	0.11	−0.13	**−0.15**	−0.05	**−0.16**	**−0.31**
ERR_OTHR	0.09	0.11	0.08	0.06	0.07	0.07		0.01	0.04	0.00	0.05	**−0.16**	0.09	0.08	0.10	**−0.14**	−0.08	0.09	0.03	−0.10
LEASE	**0.28**	**0.18**	**0.25**	**0.16**	**0.14**	**0.36**	0.02		**−0.20**	0.09	0.09	**−0.24**	−0.11	0.03	−0.07	0.05	0.16	0.09	0.06	**−0.26**
LVRG	0.01	0.03	−0.03	−0.11	−0.08	**−0.16**	0.08	**−0.28**		−0.04	−0.04	−0.03	−0.04	−0.10	0.00	−0.03	**−0.52**	**0.17**	0.01	0.10
LOSS	**0.34**	**0.47**	**0.39**	**0.32**	**0.34**	**0.33**	0.00	0.09	0.01		**0.22**	**−0.24**	−0.12	**−0.17**	**0.22**	0.07	−0.11	−0.05	−0.08	**−0.17**
DECLINE	**0.36**	**0.34**	**0.36**	**0.34**	**0.35**	**0.38**	0.05	0.12	0.01	**0.22**		**−0.27**	**−0.16**	−0.05	0.01	−0.09	−0.09	−0.13	0.07	0.04
FAVOR_C	**−0.88**	**−0.65**	**−0.68**	**−0.61**	**−0.61**	**−0.69**	**−0.17**	**−0.28**	−0.06	**−0.26**	**−0.28**		0.00	−0.09	−0.07	0.05	0.08	0.11	0.08	**0.27**
PRIOR_OBS	**−0.25**	**−0.16**	**−0.22**	**−0.21**	**−0.19**	**−0.27**	0.09	**−0.20**	0.00	−0.07	**−0.18**	0.09		**0.72**	0.01	−0.05	0.06	−0.01	**−0.14**	**−0.16**
SEC_LTR	−0.08	−0.06	−0.05	−0.06	−0.06	−0.05	0.08	0.06	−0.11	−0.17	**−0.05**	−0.11	**0.44**		−0.01	−0.04	0.11	−0.02	−0.09	−0.10
RECENT	0.12	0.11	0.08	0.09	0.10	0.06	0.10	−0.07	0.00	**0.22**	0.01	−0.10	0.05	−0.01		−0.01	−0.06	−0.02	−0.05	−0.11
ACCRLS	0.09	0.06	0.06	0.06	0.05	0.04	−0.11	−0.07	−0.05	0.03	−0.04	−0.07	**−0.17**	−0.06	0.00		0.13	−0.02	−0.01	0.02
Z_SCORE	−0.07	−0.13	−0.05	−0.08	−0.11	0.05	−0.11	**0.31**	**−0.65**	−0.12	−0.05	0.08	−0.04	0.12	−0.09	−0.01		**0.30**	−0.02	**−0.18**
MTB	**−0.24**	**−0.14**	−0.06	0.05	0.02	0.02	0.02	0.09	−0.10	−0.06	−0.10	**0.19**	−0.08	0.03	−0.02	−0.09	**0.44**		0.07	−0.04
BIG4	−0.10	−0.08	−0.10	−0.11	**−0.14**	−0.13	0.03	0.05	0.03	−0.08	0.07	0.10	**−0.14**	−0.09	−0.05	0.03	0.06	0.08		**0.32**
SIZE	**−0.23**	**−0.16**	**−0.26**	**−0.21**	**−0.21**	**−0.28**	−0.06	**−0.27**	**0.24**	**−0.15**	0.04	**0.27**	−0.09	−0.07	−0.11	0.00	**−0.15**	0.03	**0.30**	

This table reports summary statistics for the explanatory variables in our logistic regression analysis of the decision to correct lease accounting errors using restatement or a current period catch-up adjustment. Sample size varies with data availability. Quantitative Considerations are variables that measure the scaled magnitude of the accounting error. Qualitative Considerations are variables that capture information about other materiality considerations mentioned in SAB No. 99. Contextual Factors are variables not mentioned in SAB No. 99.

Variable definitions appear in the Appendix. All variables are winsorized at the 1 percent and 99 percent levels.

TABLE 3
Logistic Regression Results

Panel A: Quantitative Materiality Considerations Only

Variable	Predicted Sign	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	?	−0.579**	−0.023	−0.124	0.331	0.325	−0.445	−0.788***
Annual net income (*ERR_ANI*)	+	12.708***						6.660**
Quarterly net income (*ERR_QNI*)	+		5.538					0.567
Normalized net income (*ERR_NQNI*)	+			9.119*				−1.658
Annual sales (*ERR_ASALES*)	+				19.870			−103.600
Quarterly sales (*ERR_QSALES*)	+					25.591		80.065
Total assets (*ERR_TA*)	+						183.800***	195.400**
Sample size		244	244	244	244	244	244	244
Psudeo-R^2		31.6%	16.5%	19.6%	3.1%	3.4%	26.1%	37.6%

Panel B: Quantitative and Qualitative Materiality Considerations

Variable	Predicted Sign	Model
Intercept	?	−2.126***
ERR_ANI	+	13.412***
Other errors (*ERR_OTHR*)	+	2.945***
Lease intensity (*LEASE*)	+	1.660***
Financial leverage (*LVRG*)	+	0.853
Trigger quarterly loss (*LOSS*)	+	0.799
Trigger earnings decline (*DECLINE*)	+	0.017
Sample size		239
Psudeo-R^2		50.0%

(continued on next page)

TABLE 3 (continued)

Panel C: Materiality Considerations and Contextual Factors

The percent change in the probability of restatement is calculated by increasing each continuous variable from its first to its third quartile and increasing each discrete variable from 0 to 1 while holding all other variables at their medians.

Variable	Predicted Sign	Model	% Change in Probability
Intercept	?	5.354**	
ERR_ANI	+	2.281	9.3
ERR_OTHR	+	2.942***	40.7
LEASE	+	1.416**	38.7
LVRG	+	−1.127	−10.0
LOSS	+	1.258	28.0
DECLINE	+	−0.148	−4.6
Prior larger "catch up" adjustment % (*FAVOR_C*)	−	−4.254***	−65.8
Number of prior correction (*PRIOR_OBS*)	−	−0.576*	−17.7
Correction made after SEC letter (*SEC_LTR*)	−	0.039	3.1
Recent restatement by this firm (*RECENT*)	−	0.104	−1.4
Abnormal accruals (*ACCRLS*)	−	−0.882*	−2.5
Financial distress (*Z_SCORE*)	−	−0.070	8.1
Market-to-book (*MTB*)	−	−0.054	−3.4
Auditor (*BIG4*)	?	−0.003	−0.9
Firm size (*SIZE*)	?	−0.167	−9.8
Sample size		210	
Psudeo-R^2		62.3%	

***, **, * Denote logistic coefficient estimates significantly different from zero at the 0.01, 0.05, and 0.10 levels, respectively, based on two-tailed t-test using White-corrected standard errors.

This table reports the results of estimating a logistic regression model of the likelihood that restatement is used to correct discovered lease accounting errors. The sample is comprised of 244 lease accounting errors disclosed between November 2004 and June 2006 grouped by accounting treatment and subject to data availability. The dependent variable (*RESTATE*) is an indicator variable that equals 1 if the firm adopts restatement, and 0 if a current period catch-up adjustment is instead used.

Quantitative Considerations introduced in Panel A are variables that measure the scaled magnitude of the accounting error.

Qualitative Considerations introduced in Panel B are variables that capture information about other materiality considerations mentioned in SAB No. 99.

Contextual Factors introduced in Panel C are variables not mentioned in SAB No. 99.

Variable definitions appear in the Appendix. All explanatory variables are winsorized at the 1 percent and 99 percent levels.

sequential error corrections, this means that quantitative materiality factors are not incrementally informative when the logistic regression model includes other firms' prior actions.

Panel C, Table 3 also reports the impact (influence factor) of each explanatory variable on the estimated probability of restatement. Influence factors are constructed similar to Efendi et al. (2007) with each continuous variable changing from its first to its third quartile, and each discrete variable changing from 0 to 1. Because the probability of restatement is a nonlinear function of the explanatory variables, these calculations hold constant all other variables at their median values. The explanatory variables that exhibit statistical significance in Panel C also exert a large influence on the estimated probability of restatement. The restatement probability increases by 38.7 percent with *LEASE* but falls 65.8 percent with *FAVOR_C*. Other accounting errors (*ERR_OTHR*) increase the probability of restatement by 40.7 percent.

Auditor Effects

The absence of bright-line materiality criteria raises the possibility that some audit firms impose more stringent thresholds on their clients than do other audit firms. The restatement percentage in our sample varies by auditor. Firms with non-Big 4 auditors use restatement in 65.2 percent (15 of 23) of the cases. Among the Big 4, the restatement percentage varies from 45.6 percent (26 of 57) to 75.4 percent (43 of 57). Each Big 4 auditor has approximately the same number of firms making lease accounting corrections.

To further investigate the consistency of materiality assessments across auditors, we repeat the logistic regression analysis using auditor fixed effects and a reduced set of statistically significant explanatory variables drawn from Table 3. Table 4 reports the results of this analysis. Each Big 4 auditor fixed effect coefficient estimate is statistically indistinguishable from 0, but the null hypothesis that all auditor coefficients are 0 is rejected at the 5 percent level (Wald Chi-square test). This finding is consistent with the notion audit firms do not use identical materiality thresholds, although the effects (if present) appear small. The statistically positive intercept coefficient suggests that clients of non-Big 4 auditors are more likely to restate perhaps because these audit firms impose more stringent materiality thresholds. We are cautious about drawing this inference because our tests cannot disentangle effects uniquely attributable to audit firms from those attributable to audit clients. The positive coefficient for non-Big 4 auditors may just indicate that clients of these audit firms' tend to be smaller, with greater lease intensity and larger accounting errors than is the case for clients of Big 4 audit firms.[27]

Duration Test Results

Duration analysis provides the analytical framework for testing conjectures about clerical and strategic factors hypothesized to influence announcement timing. Proportional hazard models (Cox 1972) specify a common hazard baseline for all firms and allow each firm's hazard function to differ proportionally as a function of observed covariates such as our proxies for clerical and strategic considerations. Partial likelihood estimation of model parameters yields unbiased and asymptotically normal estimates of each covariate coefficient. The duration of interest is the number of weeks that elapse between the first correction

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[27] Audit firms may also differ in how much weight each quantitative, qualitative, and contextual factor receives when negotiating materiality assessments with clients and finalizing error correction decisions. Sample size limitations (roughly 50 observations per audit firm) unfortunately preclude rigorous examination of this question. Consequently, we cannot test for differences across auditors in the determinants of error correction decisions and materiality assessments.

TABLE 4
Auditor Fixed Effects Logistic Regression Results

Variable	Predicted Sign	Model 1	Model 2
Intercept (non-Big 4)	?	2.245**	2.130*
Annual net income (*ERR_ANI*)	+	3.454*	3.288
Other errors (*ERR_OTHR*)	+	2.860***	2.892***
Lease intensity (*LEASE*)	+	1.250***	1.315***
Prior larger "catch up" adjustment % (*FAVOR_C*)	−	−3.831***	−4.080***
Number of prior correction (*PRIOR_OBS*)	−	−0.304*	−0.230
Abnormal accruals (*ACCRLS*)	−	−0.719	−0.699
Auditor 1	?		−0.675
Auditor 2	?		0.378
Auditor 3	?		−0.732
Auditor 4	?		0.868
Sample size		231	231
Psudeo-R^2		57.7%	61.2%
Wald chi-square test: Auditor 1 = Auditor 2 = Auditor 3 = Auditor 4 = 0			9.666**

***, **, * Denote logistic coefficient estimates significantly different from zero at the 0.01, 0.05, and 0.10 levels, respectively, based on two-tailed t-test using White-corrected standard errors.

This table reports the results of estimating an auditor fixed effects logistic regression model of the likelihood that restatement is used to correct discovered lease accounting errors. The sample is comprised of 231 lease accounting errors disclosed between November 2004 and June 2006 grouped by accounting treatment and subject to data availability. The dependent variable (*RESTATE*) is an indicator variable that equals 1 if the firm adopts restatement, and 0 if a current period catch-up adjustment is instead used. In addition to Big 4 audit firm fixed effects (Auditor 1 through Auditor 4), the model includes a reduced set of explanatory variables that are statistically significant in the Table 3 logistic regressions.

Variable definitions appear in the Appendix. All explanatory variables are winsorized at the 1 percent and 99 percent levels.

announcement (Emeritus Corporation in November 2004) and sample firms' subsequent announcements. This approach allows us to determine whether a particular firm's announcement likelihood on each week is shifted upward or downward by the covariates.

The hazard rate $h(t_i)$ is the probability that firm *i* announces its error correction in week *t*, given that it has not previously announced. The structural form of the hazard model is:

$$\begin{aligned} h(t_i) = h_0(t_i)\ \exp[&\beta_1 DEADLINE(t)_i + \beta_2 LEASE_i + \beta_3 ERR\_TA_i \\ &+ \beta_4 ERR\_OTHR_i + \beta_5 SIZE_i + \beta_6 LOSS(t)_i + \beta_7 DECLINE(t)_i \\ &+ \beta_8 FAVOR\_C(t)_i + \beta_9 RESTATE_i + \beta_{10} Auditor1_i + \beta_{11} Auditor2_i \\ &+ \beta_{12} Auditor3_i + \beta_{13} Auditor4_i] \end{aligned}$$

where $h_0(t_i)$ is a baseline hazard and time-varying explanatory variables are denoted by *(t)*. Clerical factors predicted to delay announcement—a negative hazard model coefficient reflecting a downward shift in announcement likelihood—are investigation scope (lease intensity, *LEASE*) and complexity (error magnitude, *ERR_TA*, and other errors, *ERR_-*

OTHR). Internal resource availability (firm *SIZE*) and an approaching SEC filing *DEADLINE* are predicted to accelerate announcement.[28]

Strategic factors predicted to influence announcement timing are *DECLINE* and *LOSS*, which denote whether a catch-up correction adjustment would cause current quarter earnings to fall short of earnings benchmarks. The hazard model coefficients for *DECLINE* and *LOSS* are predicted to be negative because firms presumably have incentives to avoid earnings shortfalls. The *FAVOR_C* coefficient is predicted to be positive, reflecting the notion that firms accelerate (delay) announcement when the prior actions of other firms favor the less visible catch-up adjustment (restatement). Auditor fixed effects are included.

Table 5 reports the duration analysis results for our pooled sample and two conditional samples corresponding to restatement and catch-up adjustment firms, respectively. The hazard ratio shown in Table 5 indicates for each covariate the proportional change in hazard rate that occurs when the covariate increases by 1 and all other variables are held constant.

As predicted, impending SEC filing deadlines shift upward the likelihood of error announcement. The reliably negative *DEADLINE* coefficient indicates announcement acceleration. The pooled sample *DEADLINE* hazard ratio of 0.84 means that *ceteris paribus* when two firms' filing deadlines differ by one week, the firm closest to its deadline is 16 percent (or 1.00 − 0.84) more likely to announce its error correction. Distant deadlines are thus associated with announcement delays.

Contrary to our directional prediction about investigation scope, the hazard model coefficient associated with *LEASE* intensity is reliably positive in both the pooled and restatement samples. This result indicates that firms with more intensive leasing activities are quicker to announce completion of their error investigation perhaps because they perceive increased investor pressure to attain closure. The practical impact of this covariate is, however, small: a one-percentage-point increase in *LEASE* shifts upward the likelihood of announcement by only 0.2 percent. The reliably positive coefficient for investigation complexity (*ERR_TA*) among catch-sample firms also contradicts our conjecture that complexity leads to announcement delays.

The presence of other accounting errors leads to delayed announcement as evidenced by the reliably negative *ERR_OTHR* coefficient for the pooled and restatement samples. Other errors are much more common among restatement firms than among catch-up adjustment firms, which helps explain the absence of an *ERR_OTHR* effect in the catch-up sample. Consistent with our predictions, firm *SIZE* is associated with announcement acceleration in the pooled and catch-up samples. None of the remaining variables exhibit statistically significant and consistent effects across sample partitions.

Investor Reaction to Lease Accounting Errors

There are several plausible reasons why managers may have a preference for the approach used to correct lease accounting errors. Some corporate executives may fear adverse reputational effects from highly visible restatements and believe that less visible catch-up adjustments impose little reputational risk. Others may believe that restatement carries greater litigation risk or fear that restatement, but not catch-up adjustment, will adversely impact managerial pay, share price, or internal control assessment under Section 404 of the

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[28] SEC filing deadlines depend on filer status and whether the filing is annual (10-K) or quarterly (10-Q). For non-accelerated filers, quarterly (annual) filings are due 45 (90) days after the fiscal period end. Filing periods are shorter for accelerated and large accelerated filers, and vary across our sample period. Using market value to proxy for filing status, these differences in filing deadlines are reflected in the *DEADLINE* variable, which tracks the number of weeks remaining until the (estimated) SEC form 10-Q or 10-K filing deadline. *DEADLINE* is reset when the filing deadline passes and no announcement has been made.

TABLE 5
Duration Analysis Results

Variable	Predicted Sign	Pooled Sample Coefficient Estimate	Pooled Sample Hazard Ratio	Catch-Up Adjustment Sample Coefficient Estimate	Catch-Up Adjustment Sample Hazard Ratio	Restatement Sample Coefficient Estimate	Restatement Sample Hazard Ratio
Weeks until deadline (*DEADLINE*)	–	−0.170***	0.844	−0.236***	0.789	−0.131***	0.877
Lease intensity (*LEASE*)	–	0.002**	1.002	0.006**	1.006	0.002	1.002
Lease error magnitude (*ERR_TA*)	–	0.011	1.011	0.041*	1.042	0.010	1.010
Other errors (*ERR_OTHR*)	–	−0.340*	0.712	−0.098	0.907	−0.369*	0.691
Firm size (*SIZE*)	+	0.100**	1.105	0.159**	1.172	0.085	1.088
Trigger quarterly loss (*LOSS*)	–	0.083	1.087	1.185	3.271	−0.005	0.995
Trigger earnings decline (*DECLINE*)	–	0.213	1.237	0.145	1.156	0.303	1.353
Prior larger "catch up" adjustment % (*FAVOR_C*)	+	−0.175	0.840	−0.012	0.988	−0.235	0.790
Restatement dummy (*RESTATE*)	?	0.191	1.210				
Auditor 1	?	0.065	1.067	0.042	1.043	0.093	1.098
Auditor 2	?	0.591**	1.806	0.506	1.659	0.549	1.732
Auditor 3	?	0.276	1.318	0.389	1.475	0.176	1.192
Auditor 4	?	0.211	1.235	0.131	1.140	0.173	1.188
Number of firms		244		94		150	
Number of weeks		5,454		2,302		3,152	
Likelihood ratio		99.7***		56.3***		46.4***	

***, **, * Denote logistic coefficient estimates significantly different from zero at the 0.01, 0.05, and 0.10 levels, respectively, two-tailed.

This table reports the results of estimating a duration analysis. The duration for each firm is the number of weeks that elapse between the first lease error announcement (by Emeritus Corporation) and the announcement of firm *i*. The sample is comprised of 244 lease accounting errors disclosed between November 2004 and June 2006 grouped by accounting treatment (Restatement or Catch-Up Adjustment). The *LEASE* variable has been rescaled (× 100) so that an increase of 1 means an increase of 1 percent in leases as a percentage of assets and the *ERR_TA* variable has been rescaled (× 1000) so that in increase of 1 means an increase of 0.1 percentage points in the lease error as a percentage of total assets. No other variables have been rescaled. *DEADLINE* is the number of weeks until an SEC form 10-K or 10-Q filing deadline.

All other variable definitions appear in the Appendix. All explanatory variables are winsorized at the 1 percent and 99 percent levels.

Sarbanes-Oxley Act (SOX).[29] Still others may believe that investors will ignore restatements but may fail to spot the transitory earnings declines that come with one-time catch-up adjustments.

To examine investor reaction to lease error correction announcements, we employed standard "events study" methods and isolated the three-day abnormal stock returns for restatements and catch-up adjustments. The event date corresponds to the first public announcement of the lease accounting error, which may occur in a press release, 8-K, 10-K, or 10-Q filing.

Untabulated results indicate that average returns are statistically indistinguishable from zero for both restatement firms (0.54 percent) and catch-up adjustment firms (0.03 percent) during the announcement period. We also find no evidence of anticipatory stock price responses for either group in three-day windows surrounding each of the first five error correction announcements. In short, we find no evidence to suggest that investors penalized firms that disclosed lease errors. This finding does not imply that managers are indifferent to the choice of error correction methods. Managers may hold beliefs about investor reaction that later prove unfounded, or they may prefer one error correction approach over the other for reasons unrelated to investor reaction.

VI. CONCLUDING REMARKS

Beginning in late 2004 through mid-2006, more than 250 U.S. firms disclosed that the operating lease accounting methods they had been using violated GAAP. Some firms corrected the errors by restating previously issued financial statements. Others opted instead to record a current-period catch-up adjustment and thereby avoid potential negative publicity associated with restatement. Authoritative guidance requires restatement when an accounting error is deemed material but that guidance does not provide bright-line rules for assessing materiality. As a result, the chosen error correction approach in our setting thus reflects the negotiated materiality assessments of auditors and preparers. This study tests conjectures about the determinants of these materiality judgments and their role in shaping firms' error correction decisions.

We find that several quantitative and qualitative materiality considerations cited in authoritative guidance explain a large portion of the variation in firms' error correction decisions. These include: the scaled magnitude of the error; the presence of other identified accounting errors; and the importance of leasing activities to firm operations. Our results thus support the notion that materiality judgments reflect both quantitative and qualitative considerations (as suggested in SAB No. 99) rather than simple rules of thumb, e.g., 5 percent of net income. The explanatory power of our logistic regression model is quite high and suggests that, at least in settings where many firms correct similar types of accounting errors, materiality assessments in practice are remarkably consistent across firms despite widespread concerns that materiality guidance is too vague.

Our findings also bring to light a previously unrecognized feature of negotiated materiality determinations, a feature not mentioned in existing guidance. Specifically, firms' lease accounting error correction decisions appear to be influenced by the actions of other firms.[30] We find that firms favor using a catch-up adjustment when this approach has already been used by other firms to correct larger errors or when relatively few firms have used restatement to correct smaller errors. Clerical considerations contribute to the accelerated or delayed timing of firms' error correction announcement, but strategic disclosure considerations were not influential in our sample.

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[29] We find that the decision to restate for lease accounting errors is associated with the reporting of material weakness under SOX 404. Among sample firms subject to SOX 404 that discover lease errors (but no other types of accounting errors) when preparing a year-end filing, we find that material weaknesses are reported by 28 out of 58 firms that choose restatements (48 percent) and only 3 out of 44 firms that choose catch-up adjustments (7 percent). The finding that more restatement firms report a material weakness is consistent with PCAOB (2004) guidance that restatement is a strong indicator of material weakness. The finding that not all restatement firms report a material weakness is consistent with SEC (2005) guidance that discovered accounting errors even when corrected via restatement are not prima facie evidence of material weakness.

Our finding that negotiated materiality assessments seem to be influenced by the prior actions of other firms has an important policy implication for accounting regulators. An unsound decision by an early mover may induce widespread bias in materiality assessments. Public disclosure of a large error deemed immaterial (and thus corrected by means of a catch-up adjustment) may serve as an excuse for other firms to judge their own errors as immaterial. Nondisclosure of immaterial errors would eliminate this excuse. The SEC may want to consider this effect when issuing new guidance on materiality and methods of correcting immaterial errors.

APPENDIX
VARIABLE DEFINITIONS AND MNEMONICS

Mnemonic	**Definition**
Quantitative Considerations	
*ERR_*	Error magnitude, the after-tax dollar amount of the lease accounting error ("catch-up" adjustment or restatement). Positive amounts denote overstatement of past earnings.
ERR_ANI	Error magnitude scaled by annual net income as reported in the most recent 10-K published prior to the lease error correction. The absolute value of annual net income is used to preserve the sign of the accounting error (numerator) in the presence of losses.
ERR_QNI	Error magnitude scaled by net income for the fiscal quarter in which correction occurred ("catch-up" adjustment or restatement), adjusted to eliminate the effect of correction and annualized by multiplying the scale factor by 4. The absolute value of quarterly net income is used to preserve the sign of the accounting error (numerator) in the presence of losses.
ERR_NQNI	Error magnitude scaled by "normalized" quarterly net income, defined as the maximum of *QNI* as defined above or 5 percent of total assets as defined below.
ERR_ASALES	Error magnitude scaled by sales as reported in the most recent 10-K published prior to the lease correction.
ERR_QSALES	Error magnitude scaled by "annualized" sales for the fiscal quarter in which the correction occurred.
ERR_TA	Error magnitude scaled by total assets for the fiscal quarter in which correction occurred.
Qualitative Considerations	
ERR_OTHR	An indicator variable that equals 1 if the firm also corrected other (non-lease related) accounting errors, and 0 otherwise.

(*continued on next page*)

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[30] Our evidence on herding behavior in materiality judgments is admittedly indirect. Our tests establish a plausible association between firms' errors correction decisions and the previously disclosed decisions of other firms. Documenting a causal link is problematic when using archival data of the sort available in this research setting.

Mnemonic	Definition
LEASE	Operating lease intensity, defined as total operating lease commitments plus current lease expense divided by total assets, both as reported in the most recent 10-K published prior to the lease error correction.
LVRG	Financial leverage, defined as the sum of short-term and long-term debt divided by total assets using values reported in the most recent 10-K published prior to the lease error correction.
LOSS	Indicator variable that equals 1 if the "catch-up" adjustment would have triggered a loss for the quarter, and 0 otherwise.
DECLINE	Indicator variable that equals 1 if the "catch-up" adjustment would have triggered an earnings decline when compared to the same quarter one year earlier, and 0 otherwise.
Contextual Factors	
FAVOR_C	The number of larger "catch-up" adjustments (*ERR_ANI*) made prior to the firm's error correction decision announcement scaled by the total number of prior larger catch-up adjustment and smaller restatement announcements; 1 is added to the numerator and denominator to avoid dividing by 0.
PRIOR_OBS	Natural logarithm of the number of announcements between the firm's correction and the first correction in the sample.
SEC_LTR	Indicator variable equal to 1 if the firm's announcement is after the SEC guidance letter, and 0 otherwise.
RECENT	Indicator variable equal to 1 if the firm had a restatement in the 12 months prior to the lease correction, and 0 otherwise.
ACCRLS	Abnormal (discretionary) accruals estimated similar to the Modified Jones Model (Dechow et al. 1995) at the two-digit SIC level. Variables are measured from the fiscal year-end prior to the lease correction.
Z_SCORE	Financial distress, measured using Altman's Z-score (Altman 1993) applied to annual financial statement figures from the last 10-K published prior to the lease error correction.
MTB	Growth opportunities, as measured by the market-to-book ratio corresponding to the fiscal year-end prior to the lease error correction.
BIG4	Indicator variable that equals 1 if the financial statements are audited by a Big 4 audit firm, and 0 otherwise.
SIZE	Natural logarithm of total assets for the fiscal quarter of the lease correction.

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Accounting Transparency and the Asset Substitution Problem

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ABSTRACT: We develop a model to show that transparent accounting can worsen the asset substitution effect of debt. This negative effect can outweigh the usual positive effect of transparency. We demonstrate this point by comparing pure historical cost accounting to the conservatively skewed accounting regime of lower-of-cost-or-market (LCM). In a market with asymmetric information, the two regimes lead to different degrees of transparency. The more transparent LCM regime produces more efficient results for firms with lower debt levels, while the opaque rule of pure historical cost accounting is preferable for higher debt levels. We explore the implications of this result for the firm's optimal capital structure.

Keywords: *accounting transparency; asset substitution; adverse selection.*

I. INTRODUCTION

A major goal of accounting is to supply outsiders with accurate information about the financial position of organizations. More transparent accounting reduces asymmetric information and, consequently, mitigates adverse selection problems in capital markets. As a result, it reduces the cost of capital by lowering the "liquidity premium" that uninformed investors demand to protect themselves against adverse selection (see, for instance, Diamond and Verrecchia 1991; Baiman and Verrecchia 1996; Easley and O'Hara 2004). Increased liquidity and a lower cost of capital are generally beneficial to the firm and to society as a whole. Our model points out, however, that increased liquidity can exacerbate the well-known asset substitution problem of debt financing (e.g., Jensen and Meckling 1976). Depending on the firm's leverage, opaque accounting can therefore be preferred on the basis of economic efficiency. Moreover, economic agents should be more concerned with the asset substitution problem when firms use transparent accounting.

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Our model shows that the asset substitution effect of debt is more severe under transparent accounting. In a nutshell, the reasoning is as follows: Transparency reduces the asymmetry of information between the firm and the market. This reduction in asymmetric information increases the liquidity of assets and enables the firm's shareholders to sell and, therefore, substitute assets more easily. In particular, it allows them to pursue a riskier investment behavior. Such behavior leads to a reduction in the firm's investment value.

The fact that transparent accounting leads to a higher liquidity of the firm's assets follows from Akerlof's (1970) lemon problem: Under opaque accounting, the firm possesses private information about the quality of its assets and, therefore, the market cannot distinguish between good and bad assets. Hence, it is willing to pay, at most, an average price, which effectively results in a discount for good assets, the liquidity premium. The premium deters firms from selling high-quality assets and, hence, decreases the liquidity of such assets. Since transparent accounting reduces the asymmetric information between the firm and the market, it increases the liquidity of high-quality assets.

We apply our arguments to the current GAAP practice of historical cost accounting under a lower-of-cost-or-market (LCM) rule and compare it to the practice of pure historical cost accounting. Assets that are valued at pure historical cost are uninformative about changes in their value after purchase. In contrast, the LCM rule is, by construction, more informative because it obliges firms to reveal when the asset has decreased in value. We argue that in a market in which firms possess private information, the two rules lead to different degrees of transparency. Subsequently, we show that for equity firms that do not face the asset substitution problem, the more transparent LCM regime leads to a higher investment value. We show, however, that this result is overturned when the firm is financed by debt and faces an asset substitution problem.

Illustrating the model with concrete accounting rules enables us to connect our results to the strand of the accounting literature that investigates the benefits and drawbacks of conservative accounting. At a fundamental level, our model is most related to Venugopalan (2004), who argues that accounting rules differ in their degree of informativeness. Indeed, we start with the natural observation that conservatively skewed accounting conveys more overall information than unresponsive pure historical cost accounting. Although related, this observation constitutes an important difference from Venugopalan (2004), who assumes that the informativeness of an accounting regime depends on the type of signal.[1] Our explanation also differs from Watts (2003) and Chen et al. (2007), who explain conservative accounting as an optimal response to the possibility of earnings manipulation. The issue also differs from Kwon et al. (2001), who show that conservatism relaxes limited liability constraints, and Bagnoli and Watts (2005), who focus on the signaling feature of accounting choice.

In contrast to these models, our focus is on how the informativeness of different accounting regimes affects the investment incentives of shareholders. As the owners of the firm, the shareholders determine the firm's investment behavior. When shareholders do not fully own the firm, their incentives are not aligned with the goal of maximizing economic efficiency. Hence, from the perspective of economic efficiency, the problem can be represented as an agency problem. As a consequence, our model is related to Baldenius and Reichelstein (2005), who compare the incentive effects of historical cost versus LCM accounting in the context of inventory control. Whereas these authors focus on an agency problem between a firm's shareholders and a manager who controls the inventory, our focus is on the incentive problems between share and debtholders that relate to economic efficiency.

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[1] In particular, Venugopalan (2004) assumes that conservative measures are more informative about good signals, whereas more liberal accounting is more informative about bad signals (see also Antle and Lambert 1988; Demski and Sappington 1990; Gigler and Hemmer 2001).

Finally, using an extension based on Liang and Zhang (2006), we investigate the impact of the accounting regime on a firm's capital structure. In this extension, the optimal level of debt depends on a trade-off between the asset substitution problem, bankruptcy costs, and the extra cost of equity. We show that, due to the more intensive asset substitution problem, the optimal level of debt is lower for firms that operate under LCM accounting. Whenever the optimal level of debt is relatively large, historical cost accounting leads to higher economic efficiency than LCM accounting. If the firm's optimal level of debt is smaller than some critical cutoff level, then LCM accounting yields larger economic efficiency.

The next section introduces the model that we use to demonstrate our results. Section III demonstrates the unambiguous beneficial effect of transparent accounting for a firm financed by pure equity. Section IV considers levered firms and shows that the resulting asset substitution problem is more severe under transparent accounting; for high levels of debt, opaque accounting leads to more efficient outcomes than transparent accounting. In Section V we argue that endogenous interest rates have a reinforcing effect that tends to worsen the case for transparent accounting. Section VI investigates the model's implication for a firm's optimal capital structure. In Section VII we discuss our results and conclude. All formal proofs of the propositions are presented in the Appendix.

II. THE MODEL

Consider a firm that operates for two consecutive periods $t = 1,2$.[2] In period $t = 1$ it can invest in a first project, project 1. The project requires a fixed investment $I_1 = 1$. It matures after period $t = 2$. Initially, it is known that project 1 is successful with probability p_1, in which case it yields a cash flow of x_1. A failure of the project occurs with probability $1 - p_1$ and leads to a cash flow of 0. To make the initial investment nontrivial, we assume that the probability of success is high enough to recoup the initial investment, i.e., $x_1 > 1/p_1$.

At the beginning of period $t = 2$ the firm can invest in a second project, project 2. This project also matures at the end of period 2. Project 2 is, however, scalable and the firm may invest any amount $I_2 > 0$. The project is successful with probability h, in which case it yields a cash flow of x_2 per invested amount. If the project fails, which occurs with probability $1 - h$, it yields 0. In period $t = 0$, it is only known that the probability of success h is uniformly distributed on $[0,1]$ so that the expected return of project 2 per unit invested is $x_2/2$. We assume that, per unit invested, a successful project 2 yields more than a successful project 1, but without further information about h, project 2 yields a negative expected return, i.e., $x_1 < x_2 < 2$.[3] Importantly, we assume that the firm cannot raise new capital to invest in project 2. Hence, if the firm wants to invest in project 2, then it has to sell project 1 first. This financing constraint of the firm is crucial, because it creates a role for the liquidity of the firm's initial assets.[4]

After investing in the first project, the firm receives some private information $i \in \{g,b\}$ about project 1. With probability q the information is good, which means that the probability of success rises from p_1 to p_g. If the firm receives bad information, which occurs with probability $1 - q$, then the probability of success reduces to p_b, where $p_g > p_1 > p_b$.[5] Bad information implies that the expected return of the project is lower than the initial investment, while good information implies that the expected return of the project exceeds the initial investment. That is, $p_b x_1 < 1 < p_g x_1$. After the firm receives its information, two types of firms then exist: good firms that received good information and hold a project that succeeds with probability p_g; and bad firms that hold a project that succeeds with the lower probability p_b. Because the information is private, the firm's type is unknown by outsiders.

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[2] The model is based on Burkhardt (2001).

[3] Together with $x_1 > 1/p_1$ this implies $p_1 > 1/2$.

[4] An alternative interpretation is that the firm securitizes its assets in place. Under this interpretation the accounting method affects the informational position of the institution that securitizes its assets and, therefore, the revenue from securitization.

At the end of period $t = 1$ the firm publishes its accounts according to the accounting regime. Accounting is truthful and non-strategic. That is, if the firm is required to use pure historical cost accounting, the firm lists its assets at the historical price $I_1 = 1$. This accounting rule is especially opaque, because the rule is completely uninformative to outsiders. Under the LCM rule, accounting differs. The bad firm lists its assets at the lower value $p_b x_1$, because the market price $p_b x_1$ is lower than the historical cost price. The good firm lists its assets at the historical price $I = 1$. The two accounting rules therefore differ in their informativeness and amount of transparency. Pure historical cost accounting is less informative than the conservative LCM rule.[6] It is this difference in informativeness that drives our results.

At the beginning of period $t = 2$, the firm learns the probability of success, h, of project 2 and must decide whether it wants to invest in it. As mentioned, the investment is only possible if the firm decides to sell its first project. Since the second project is fully scalable, it can invest the entire proceeds V into the second project. In this case, $I_2 = V$. Clearly, the firm will only use the reinvestment opportunity, if V and h are large enough.

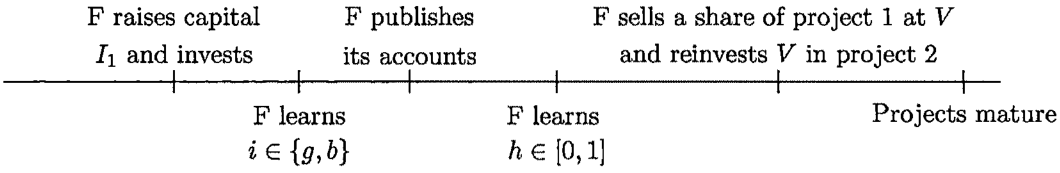
At the end of period 2 the projects mature and the firm obtains its payoff. Figure 1 summarizes the different stages in a timeline.

III. PURE EQUITY

We first investigate the firm's investment behavior when it is fully funded by equity. We show that when the firm has no debt, the more transparent LCM rule mitigates an underinvestment problem that occurs under the opaque historical cost regime. As a consequence, the more conservative LCM regime is welfare superior.

We solve the model backward. In period $t = 2$, the firm observes the probability of success h and has to decide whether to sell its stake in the first in order to invest in the second project. The reinvestment is profitable if the expected profit of project 2 is larger

FIGURE 1
Timeline



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[5] Statistical consistency requires $p_1 = qp_g + (1 - q)p_b$.

[6] Due to the binary nature of the model, the conservative LCM rule is informationally equivalent to marking-to-market.

than the expected profit of the old project. That is, given the firm's information $i \in \{b,g\}$, and its ability to sell its first project at a price V, a swap of projects is profitable if:

$$hVx_2 \geq p_i x_1.$$

Clearly, the proceeds of the sell-off, V, play a crucial role in the firm's reinvestment decision.

Under the conservative LCM regime the firm's accounts are informative about the underlying assets so that the proceeds V are easily determined. In particular, when the market observes that assets are valued at $I_1 = 1$, the firm has received good news and the market is willing to pay the fair price $V = p_g x_1$. On the other hand, if the firm lists its assets at $p_b x_1$, then this reveals the firm's bad information and the market price is $V = p_b x_1$. Importantly, this outcome is consistent with the underlying definition of LCM accounting: The market's replacement value for bad assets is $p_b x_1$ and is indeed lower than the historical cost $I_1 = 1$. Therefore, bad assets are to be valued at $p_b x_1$. In contrast, the market values good assets at a price $p_g x_1$, which exceeds the historical cost of $I_1 = 1$. The asset's replacement value is, therefore, larger than historical cost and, according to the LCM rule, the firm has to value its asset at $I_1 = 1$. Hence, in the LCM regime a firm of type $i \in \{b,g\}$ is able to sell its first project at the fair price $V_i = p_i x_1$. It follows that the firm swaps projects only if the probability of success, h, exceeds the critical level of

$$h_i^L \equiv \frac{1}{x_2}.$$

The critical level is independent of the firm's type: $h_b^L = h_g^L = 1/x_2$.

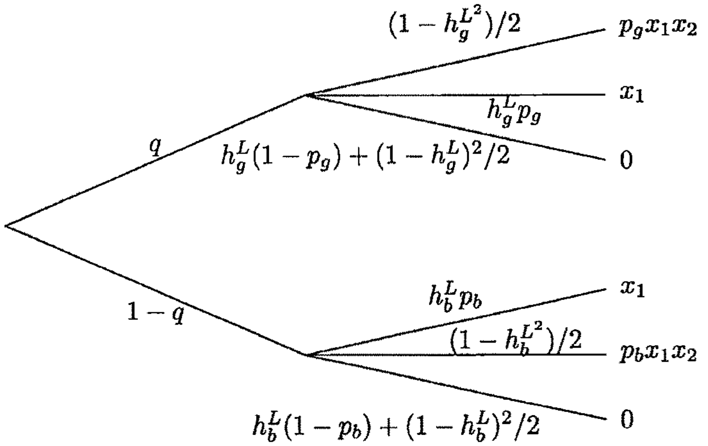
Given the firm's investment behavior, we can calculate the firm's *ex ante* expected present value under LCM accounting. Recalling that the success probability h is uniformly distributed over [0,1], the investment value computes as:

$$\begin{aligned} PV^L &= q\left[\int_0^{h_g^L} p_g x_1 dh + \int_{h_g^L}^1 hp_g x_1 x_2 dh\right] + (1-q)\left[\int_0^{h_b^L} p_b x_1 dh + \int_{h_b^L}^1 hp_b x_1 x_2 dh\right] \\ &= q\left[h_g^L p_g x_1 + \frac{1}{2}(1 - h_g^{L2})p_g x_1 x_2\right] + (1-q)\left[h_b^L p_b x_1 + \frac{1}{2}(1 - h_b^{L2})p_b x_1 x_2\right]. \end{aligned} \tag{1}$$

For future reference, the firm's cash flow distribution under LCM accounting is given by Figure 2.

Under the opaque rule of pure historical cost accounting, the sale of the old project differs. In this case, the firm's balance sheets are uninformative about the firm's private information and the market cannot distinguish between good and bad assets. As a consequence, there is only one market price at which both good and bad projects are traded. This leads to Akerlof's problem of adverse selection. Because the market price does not reflect the asset's true quality, rational market participants are only willing to pay an average price that, in equilibrium, is consistent with the average quality offered in the market. This implies that good projects are sold at a discount. When this discount is too large, adverse selection occurs and good firms withhold their projects from the market. As a result, only bad projects are offered and this results in a low market price $p_b x_1$. The following proposition shows formally that adverse selection occurs for $p_b x_2 < p_g$.

FIGURE 2
Cashflow Distribution under LCM Accounting



Proposition 1: For $p_b x_2 < p_g$, there exists a market equilibrium in which only firms holding a bad project sell their projects and the market price is $V = p_b x_1$.

Indeed, given that the market offers to buy projects at price $V = p_b x_1$, the discount for a good project is $(p_g - p_b)x_1$. That is, if $p_b x_2 < p_g$, then even a firm that is sure that the second project succeeds, $h = 1$, is unwilling to sell the first project to invest in the second one. In fact, the critical probability, h_g^H, that would make a good firm indifferent to the reinvestment opportunity exceeds 1:

$$h_g^H p_b x_1 x_2 = p_g x_1 \Rightarrow h_g^H \equiv \frac{p_g}{p_b x_2} > 1.$$

In the remainder of this paper we focus on the case $p_b x_2 < p_g$ and the associated equilibrium of Proposition 1.[7,8]

It follows that under pure historical cost accounting only a bad firm reinvests. It will do so exactly when $h p_b x_1 x_2$ exceeds $p_b x_1$. That is, reinvestment is optimal whenever the probability of success h exceeds the critical level of:

$$h_b^H \equiv \frac{1}{x_2}.$$

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[7] Proposition 1 only shows the existence of the equilibrium and not uniqueness. It can, however, be shown that an equilibrium in which firms that hold a good investment sell their project does not exist if x_2 is small enough, in particular, if $p_g/p_b > (2\sqrt{x_2} + x_2 - 1)/(2\sqrt{x_2} - x_2 + 1)$.

[8] Qualitative results remain unchanged for $p_b x_2 > p_g$. In this case a good firm may actually sell its first project, but will still receive a discount. This discount causes a difference between h_g^H and h_g^L on which all our results ultimately depend. The adverse selection equilibrium is, however, more analytically tractable.

Cash flows under the opaque pure historical cost accounting are distributed according to Figure 3 and the expected investment value from an *ex ante* point of view can be calculated as:

$$PV^H = qp_gx_1 + (1 - q)\left[\int_0^{h_b^H} p_bx_1dh + \int_{h_b^H}^1 hp_bx_1x_2dh\right]$$
$$= qp_gx_1 + (1 - q)\left[h_b^Hp_bx_1 + \frac{1}{2}(1 - h_b^{H2})p_bx_1x_2\right]. \tag{2}$$

Comparing the investment values PV^H and PV^L yields the following result:

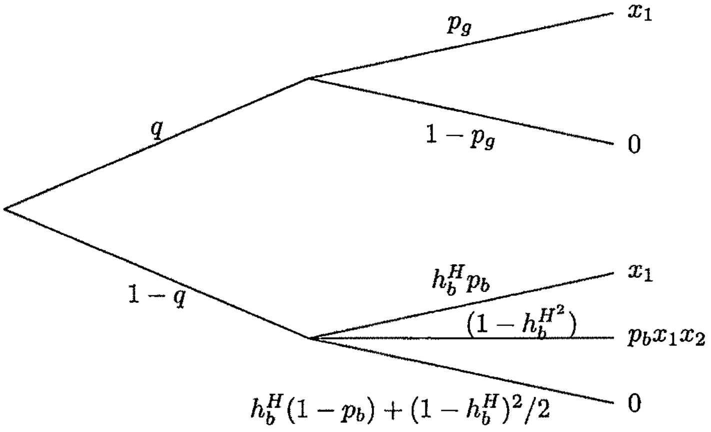
Proposition 2: The opaque regime of pure historical cost accounting leads to underinvestment and a welfare loss. The more transparent regime of lower-of- cost-or-market induces an efficient investment behavior.

The proposition provides a normative argument in favor of the more transparent LCM regime: it prevents economic inefficiencies. This is in line with conventional wisdom that more transparency is beneficial.

IV. THE ASSET SUBSTITUTION PROBLEM

In this section we consider a levered firm that is partially financed by debt. Debt leads to an asset substitution problem, because it induces the firm to benefit from riskier decisions at the expense of debtholders.[9] The asset substitution problem leads to economic inefficiencies: debtholders lose more from the substitution than shareholders gain. As a consequence, overall welfare shrinks. We first show that, even though the asset substitution occurs

FIGURE 3
Cashflow Distribution under (Pure) Historical Cost Accounting



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[9] We abstract from additional problems of moral hazard between the firm's owners, the equity holders, and its management.

under both regimes, it is less severe under pure historical cost accounting. This identifies a disadvantage of transparent accounting. We next show that, for high enough debt levels, this negative effect outweighs the positive one that we identified in the previous section. This section, therefore, concludes that, for high debt levels, opaque accounting leads to more efficient outcomes.

Suppose that the firm raises both equity $e < 1$ and debt $d = 1 - e > 0$ in order to obtain the required capital for the initial project, $I_1 = 1$. To compensate debtholders for the risk of default, debt may be issued at interest rate $r \geq 0$, which possibly exceeds the debtholder's riskless interest rate of zero.[10] Debt changes the payoff function of the firm's shareholders. A final cash flow of CV yields them a payoff of $\max\{0, CV - d(1 + r)\}$. The convexity of this payoff function leads to the asset substitution problem. In order to circumvent laborious case distinctions, we restrict attention to debt levels d and interest rates r for which the firm can, in expectation, repay debtholders in the case of a bad project, i.e., $(1 + r)d < p_b x_1$. In this section we take the interest rate r as given. Section V addresses the issue of endogenous interest rates.

The analysis follows the approach of the previous section. We first calculate the critical success probabilities to determine the firm's investment behavior.

Under LCM accounting the capital market deduces the firm's information $i \in \{g,b\}$ from its accounts and the firm is able to sell its assets at the fair price $V_i = p_i x_1$. To a good firm, a successful reinvestment yields $p_g x_1 x_2 - d(1 + r)$, which, due to $(1 + r)d < p_b x_1 < p_g x_1 x_2$, is larger than zero. Hence, the expected payoff from switching investments is $h(p_g x_1 x_2 - d(1 + r))$. In contrast, the expected payoff from holding onto the initial investment is $p_g(x_1 - d(1 + r))$, which, due to $p_g(1 + r)d < (1 + r)d < p_b x_1 < p_g x_1$, is also larger than zero. Hence, a firm using transparent accounting and holding a good investment reinvests exactly when the probability of success, h, exceeds the threshold value:

$$h_g^L(d) \equiv \frac{p_g(x_1 - d(1 + r))}{p_g x_1 x_2 - d(1 + r)}. \tag{3}$$

For $d = 0$, we obtain the same cutoff value as in the previous section; $h_g^L(0) = h_g^L < 1$. Differentiating with respect to d yields:

$$\frac{\partial h_g^L(d)}{\partial d} = -\frac{p_g x_1(p_g x_2 - 1)(1 + r)}{(p_g x_1 x_2 - d(1 + r))^2} < 0 \tag{4}$$

and reveals that, due to $p_g x_2 > 1$, the cutoff value $h_g^L(d)$ is decreasing in d.

The decreasing threshold illustrates the asset substitution effect of debt. If the firm holds more debt, the default option becomes relatively more attractive, because the firm does not have to pay back the debt if it defaults. Hence, debt skews the choice between project 1 and project 2 toward the project that has a higher probability of default. Without debt we showed that the firm is indifferent to projects 1 and 2 exactly for the success probability $h_g^L = 1/x_2$. Because at h_h^L project 2 has, due to $p_g > 1/x_2$, the higher probability of default, debt changes the firm's indifference at h_g^L to a strict preference for project 2. Hence, the asset substitution effect induces good firms to swap their investments for lower success probabilities; the threshold level $h_g^L(d)$ is decreasing in d. It implies that a levered firm follows a riskier investment strategy, leading to a higher probability of default.

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[10] The opportunity cost of debt is still 1 so that the present value PV is still a meaningful measure of welfare.

We may establish a similar asset substitution effect for a bad firm. A firm holding a bad project can sell its first investment only at the lower price $p_b x_1$. The expected payoff from switching the investment is $h(p_b x_1 x_2 - d(1 + r))$, which, due to $(1 + r)d < p_b x_1 < p_b x_1 x_2$, is positive. In contrast, the expected payoff from holding onto the initial investment is $p_b(x_1 - d(1 + r))$, which, due to $p_b(1 + r)d < (1 + r)d < p_b x_1$, is also positive. The truncated threshold value $h_b^L(d)$ above which a bad firm wants to reinvest satisfies:[11]

$$h_b^L(d) = \begin{cases} \dfrac{p_b(x_1 - d(1 + r))}{p_b x_1 x_2 - d(1 + r)}, & \text{if } d < \bar{d} \equiv \dfrac{p_b x_1(x_2 - 1)}{(1 - p_b)(1 + r)}; \\ 1, & \text{otherwise.} \end{cases} \tag{5}$$

For $d < \bar{d}$ it follows, due to $p_b x_2 < p_g < 1$, that:

$$\frac{\partial h_b^L(d)}{\partial d} = \frac{p_b x_1(1 - p_b x_2)(1 + r)}{(x_1 x_2 p_b - d(1 + r))^2} > 0. \tag{6}$$

It is positive, due to $p_b x_2 < p_g < 1$, and implies that a levered firm swaps investments less often.

To understand why, for bad firms, debt increases rather than decreases the threshold level $h_b^L(d)$, recall that debt skews the choice between projects toward the one with the higher probability of default. Without debt we showed that a bad firm is indifferent to projects 1 and 2 exactly for the success probability $h_b^L = 1/x_2$. But at h_b^L project 1 has, due to $p_b < 1/x_2$, the higher probability of default. Contrasting the effect of debt on a good firm, debt changes the indifference of a bad firm to a strict preference for project 1. Hence, the asset substitution effect induces bad firms to swap their investments only for a higher success probability; the threshold level $h_b^L(d)$ is increasing in d. Notwithstanding the different effects on the thresholds, the asset substitution effect implies that a levered firm follows a riskier investment strategy and raises the probability of default.

We next turn to the behavior under the opaque regime of pure historical cost accounting. First, we argue that Proposition 1 remains valid: due to the adverse selection problem, the market values assets at the lower price $p_b x_1$. Indeed, if the resale value of the asset is $V = p_b x_1$, the expected payoff from switching investments is $h(p_b x_1 x_2 - d(1 + r))$. To a good firm, the expected payoff from holding onto the initial investment is $p_g(x_1 - d(1 + r))$. But, due to $p_b x_2 < p_g$, it follows that $p_b x_1 x_2 - d(1 + r) < p_g x_1 - d(1 + r) < p_g(x_1 - d(1 + r))$. Even for a success probability of $h = 1$, a good firm will not want to sell its initial investment. A rational market anticipates that a good firm does not offer its investment for sale and correctly prices any offered asset at $V = p_b x_1$. Consequently, $V = p_b x_1$ is also an equilibrium price when the firm is financed with debt. Proposition 1 remains valid and good firms never reinvest. A direct consequence is that the truncated threshold value $h_g^H(d)$ is:

$$h_g^H(d) \equiv 1.$$

It leads to the insight that, under historical cost accounting, there is no asset substitution effect for good firms: $\partial h_g^H / \partial d = 0$. This insight drives our main results.

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[11] The truncation at $\bar{d}$ reflects the fact that for larger debt levels a bad firm will not even want to reinvest when the probability of success is 1.

In contrast to good firms, debt leads to an inefficient substitution of assets for bad firms. The resale value V equals $p_b x_1$, which, to a bad firm, is equivalent to its resale value under LCM accounting. As a result, the threshold value $h_b^H(d)$ coincides with the threshold value $h_b^L(d)$:

$$h_b^H(d) = \begin{cases} \dfrac{p_b(x_1 - d(1 + r))}{p_b x_1 x_2 - d(1 + r)}, & \text{if } d < \tilde{d} \equiv \dfrac{p_b x_1(x_2 - 1)}{(1 - p_b)(1 + r)} \\ 1, & \text{otherwise.} \end{cases} \tag{7}$$

We find that the asset substitution effect for bad firms is the same under both accounting regimes, but does not occur for good firms under the opaque regime. We, therefore, obtain the following result:

Proposition 3: The asset substitution effect of debt is less pronounced under historical cost accounting.

Because the asset substitution effect lowers welfare, the proposition identifies an advantage of historical cost accounting. Yet, Proposition 2 shows that historical cost accounting has the unambiguous disadvantage that it leads to an underinvestment problem. The overall welfare effect of the accounting regime therefore depends on a trade-off between the underinvestment effect and the asset substitution effect. Because the asset substitution problem increases with the debt level, one may expect that the outcome of the trade-off depends on the firm's debt level. The remainder of this section confirms this intuition. It shows that when the debt level is large enough, the asset substitution problem outweighs the underinvestment problem.

When the firm uses LCM accounting, the cash flow distribution is given by Figure 2. Recalling that the success probability h is uniformly distributed over [0,1], the investment value gross of financing costs is:

$$\begin{aligned} PV^L(d) = {} & q\left[h_g^L(d)p_g x_1 + \frac{1}{2}(1 - h_g^L(d)^2)p_g x_1 x_2\right] \\ & + (1 - q)\left[h_b^L(d)p_b x_1 + \frac{1}{2}(1 - h_b^L(d)^2)p_b x_1 x_2\right]. \end{aligned}$$

Cash flows under historical cost accounting are distributed according to Figure 3. The gross expected investment value from an *ex ante* point of view is:

$$PV^H(d) = qp_g x_1 + (1 - q)\left[h_b^H(d)p_b x_1 + \frac{1}{2}(1 - h_b^H(d)^2)p_b x_1 x_2\right].$$

With debt financing, the investment value gross of financing costs, PV, is still an appropriate measure of the aggregate surplus or welfare. The debtholders invest d and receive the repayment $(1 + r)d$ when there is no default. Their expected payoff is, therefore, $V_d = (1 - k)(1 + r)d - d$, where $k \in [0,1]$ represents the probability of default. As owners of the firm, the shareholders obtain the investment value minus the payment to the debtholders. Their expected payoff is $V_e = PV - (1 - k)(1 + r)d - e$. Consequently, the aggregate surplus is $V = V_e + V_d = PV - e - d = PV - 1$. A comparison of the two investment values reveals the following result.

Proposition 4: The investment value decreases with debt d. The decrease is less pronounced under historical cost accounting: $\partial PV^L/\partial d < \partial PV^H/\partial d < 0$. Historical cost accounting yields a larger investment value exactly when:

$$d > \hat{d} \equiv \frac{p_g x_1 x_2 (x_2 - 1)}{(x_2(1 + p_g) - 2)(1 + r)}.$$

Proposition 4 shows that the presence of debt can reverse the beneficial effect of transparent LCM accounting that was obtained in Proposition 2. It calculates the exact cutoff value, $\hat{d}$, at which the negative asset substitution problem and the positive investment effect are balanced. For debt levels that exceed $\hat{d}$, the result of Proposition 2 is reversed. From an efficiency point of view, opaque historical cost accounting is preferable.

V. EQUILIBRIUM INTEREST RATES

In the previous section we took the interest rate r as exogenously fixed and established that the asset substitution problem is more severe under LCM accounting. A special case is $r = 0$, for which the debtholders do not require any compensation for default risk. This case is relevant when the firm is a bank and the debtholders are the depositors. In most countries, depositors are protected by deposit insurance, which implies that deposits are risk free. Hence, the market's interest rate of deposits will equal the risk free rate so that, independent of the accounting regime, $r = 0$.[12]

In general, however, debtholders are not insured for their holdings and will demand an appropriate compensation for the risk of default. To make this more precise, suppose the firm's debt is provided by risk-neutral creditors who expect a default with probability k^e. In a competitive credit market these creditors demand a "fair" interest rate r of $k^e/(1 - k^e)$. In this section we characterize the rational expectation equilibrium in which the debtholders' expectation k^e is confirmed. This determines an endogenous equilibrium interest rate r^*. We show that also with endogenous interest rates a critical debt level exists above which LCM accounting does worse. Intuitively, endogenous interest rates intensify the asset substitution problem, because a higher interest rate is equivalent to a proportional increase in the firm's debt level.

In order to show this formally, we first make explicit the direct dependence of investment behavior, as expressed in Equations (3), (5), and (7), on both the debt level d and the interest r by writing $h_i^L(d,r)$ and $h_i^H(d,r)$. If debtholders expect a default with probability k^e, then they demand an interest rate of $r^*(k^e) = k^e/(1 - k^e)$.

In a rational expectation equilibrium, the depositor's expectations k^e are confirmed; they coincide with the actual default probability. In order to obtain the equilibrium, we must therefore address the default probabilities of the firm under the different accounting regimes. The probability of default follows directly from the cash flow distributions in Figures 2 and 3. In particular, we obtain from Figure 2 that the probability of default under LCM accounting, k_L, equals:

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[12] The banking application is also highly relevant in another respect. Banks are typical institutions where the debt ratio is very high, because the bank's financial liabilities are mainly deposits.

$$k_L = q\left[h_g^L(d,r^*(k^e))(1 - p_g) + \frac{1}{2}(1 - h_g^L(d,r^*(k^e)))^2\right] + (1 - q)\left[h_b^L(d,r^*(k^e))(1 - p_b) + \frac{1}{2}(1 - h_b^L(d,r^*(k^e)))^2\right]. \tag{8}$$

Likewise, it follows from Figure 3 that the probability of default under historical cost accounting, k_H, is:

$$k_H = q(1 - p_g) + (1 - q)\left[h_b^H(d,r^*(k^e))(1 - p_b) + \frac{1}{2}(1 - h_b^H(d,r^*(k^e)))^2\right]. \tag{9}$$

The expressions demonstrate that the debt level d and the investor's beliefs k^e affect the risk of default only indirectly through a change in the firm's investment behavior h_i^L and h_i^H. Straightforward calculations demonstrate the following intermediate result:

Lemma 1: The probability of defaults k_L and k_H as defined by Equations (8) and (9) are increasing in the debt level d and the investor's beliefs k^e. The rise is smaller under historical cost accounting:

$$\frac{\partial k_L}{\partial d} > \frac{\partial k_H}{\partial d} \geq 0; \frac{\partial k_L}{\partial k^e} > \frac{\partial k_H}{\partial k^e} \geq 0.$$

In equilibrium the debtholders' beliefs about the probability of default coincide with the actual probability of default; $k^e = k$. The following condition determines the probability of default under LCM accounting, $k_L^*(d)$, in equilibrium:

$$k_L^*(d) = q\left[h_g^L(d,r^*(k_L^*(d)))(1 - p_g) + \frac{1}{2}(1 - h_g^L(d,r^*(k_L^*(d))))^2\right] + (1 - q)\left[h_b^L(d,r^*(k_L^*(d)))(1 - p_b) + \frac{1}{2}(1 - h_b^L(d,r^*(k_L^*(d))))^2\right]. \tag{10}$$

Likewise, the equilibrium probability of default under historical cost accounting, $k_H^*(d)$, satisfies:

$$k_H^*(d) = q(1 - p_g) + (1 - q)\left[h_b^H(d,r^*(k_H^*(d)))(1 - p_b) + \frac{1}{2}(1 - h_b^H(d,r^*(k_H^*(d))))^2\right]. \tag{11}$$

These equilibrium conditions yield polynomials of the fifth order and cannot be solved analytically. We nevertheless demonstrate that, even with endogenous interest rates, LCM accounting does worse than historical cost accounting for high-enough debt levels. The idea is to consider extreme debt levels, where, intuitively, the inefficient asset substitution effect is largest. Indeed, Inequality (4) reveals that, due to the asset substitution problem, $h_g^L(\cdot)$ is decreasing in d so that, from a welfare perspective, a levered firm with good information reinvests too often. In the extreme, a good firm always reinvests under LCM accounting regardless of the success probability h, i.e., $h_g^L = 0$. Likewise, the asset substitution effect implies that $h_b^L(\cdot)$ is increasing in d; a levered, bad firm reinvests too little. In the extreme, the levered firm will never reinvest; $h_b^L = 1$.

The next lemma show that the extreme debt level that we need to consider is:

$$\breve{d} \equiv (q/2 + (1 - q)p_b)x_1.$$

Lemma 2: At a debt level $\breve{d}$ a good firm always reinvests ($h_g^L = 0$), a bad firm never reinvests ($h_b^L = 1$), and the equilibrium probability of default equals $k_L^*(\breve{d}) = q/2 + (1 - q)(1 - p_b)$ under LCM accounting.

The lemma implies that under LCM accounting the investment's present value at debt level $\breve{d}$ is:

$$\overline{PV^L} \equiv PV^L|_{d=\breve{d},r=r_L^*} = qp_g x_1 x_2/2 + (1 - q)p_b x_1.$$

We next derive a lower bound on the firm's investment value under historical cost accounting. Due to the lemons problem, the good firm never reinvests under historical cost accounting, $h_g^H = 1$. Moreover, the most inefficient distortion under historical cost accounting is that the bad firm also never reinvests. Hence, a lower bound of the investment value under historical cost accounting obtains for $h_g^H = h_b^H = 1$. In this case, the investment's present value is simply the expected return of project 1:

$$\overline{PV^H} = qp_g x_1 + (1 - q)p_b x_1.$$

Consequently, $\overline{PV^L}$ and $\overline{PV^H}$ differ only in that, under the LCM regime, the good firm always reinvests, whereas it never reinvests under historical cost accounting. Due to our assumption that, without any additional information about the success probability h, project 2 has a negative expected return ($x_2 < 2$), it follows $\overline{PV^L} < \overline{PV^H}$. By continuity, we arrive at the following result:

Proposition 5: Suppose interest rates are endogenous. Then there exists a debt level $\bar{d} < \breve{d}$ such that the investment value under LCM is strictly lower than under historical cost accounting for any $d > \bar{d}$.

In order to understand more clearly the effect of endogenous interest rates, we first confirm the intuition that the default probabilities in equilibrium are increasing with the debt level d. Moreover, because the asset substitution effect is less severe under historical cost accounting, the default probability increases faster under LCM accounting.

Lemma 3: Suppose interest rates are endogenous and $x_2 > 1/(2p_g - 1)$. Then the equilibrium probability of default, k_i^*, and, consequently, the equilibrium interest rates, r_i^*, are increasing in the debt level d. The increase is less pronounced under historical cost accounting:

$$\frac{\partial k_L^*}{\partial d} \geq \frac{\partial k_H^*}{\partial d} \geq 0.$$

A formal proof of the proposition is presented in the Appendix, but we may explain its intuition by referring to Lemma 1 and considering an increase in the debt level d when debtholders demand a fair compensation for default risk. In particular, suppose that, for a given debt level d, the equilibrium probability of default is $k = k^e$. Now suppose the firm takes on a larger debt level $d' > d$. According to the first part of Lemma 1, the increase in debt leads to a larger default risk. Hence, debtholders will raise their belief k^e. But, according to the second part of Lemma 1, an increase in the belief k^e will further increase the actual probability of default. This prompts a further increase in the debtholders' beliefs k^e, which results in an even higher default risk, etc.[13] This reasoning indicates a multiplier effect of endogenous interest rates, which exacerbates the asset substitution problem of debt.

Proposition 4 shows that when the interest rate r is exogenously fixed, an increase in debt level d lowers the firm's value under LCM accounting, PV^L, more than the firm's value under historical cost accounting, PV^H. When the interest rate is endogenous, there is a new, additional effect, in that a change in the debt level d also affects the equilibrium interest rate r^*. Formally, we have:

$$\begin{aligned} PV_a^*(d) &\equiv PV^a(d,r^*(k_a^*(d))) \\ &= q\left[h_g^a(d,r^*(k_a^*(d)))p_g x_1 + \frac{1}{2}\left(1 - h_g^a(d,r^*(k_a^*(d)))^2\right] p_g x_1 x_2\right] \\ &\quad + (1-q)\left[h_b^a(d,r^*(k_a^*(d)))p_b x_1 + \frac{1}{2}(1 - h_b^a(d,r^*(k_a^*(d)))^2)p_b x_1 x_2\right], \end{aligned}$$

where $a \in \{H,L\}$ represents the accounting regime in place. The overall change in the firm's value due to a change in the debt level is:

$$\frac{dPV_a^*}{dd} = \frac{\partial PV^a}{\partial d} + \frac{\partial PV^a}{\partial r}\frac{\partial r^*}{\partial k}\frac{\partial k_a^*}{\partial d}. \tag{12}$$

The first term represents the direct effect. The second part represents the indirect effect and consists of three terms. The last term $\partial k_a^*/\partial d$ measures how the changes in debt level d affect the equilibrium default risk. The second term, $\partial r^*/\partial k$, measures how changes in the default risk lead to an additional compensation in the interest rate for debtholders. The first term, $\partial PV^a/\partial r$, measures the impact of interest rate changes on the firm's value. The next lemma shows that even with endogenous interest rates, the investment value falls faster under LCM accounting for *any* debt level d.

Lemma 4: Suppose interest rates are endogenous and $x_2 > 1/(2p_g - 1)$. Then the present value of the investment decreases with debt d. The decrease is less pronounced under historical cost accounting:

$$\frac{dPV_L^*}{dd}(d) \leq \frac{dPV_H^*}{dd}(d) < 0.$$

VI. ACCOUNTING REGIME AND CAPITAL STRUCTURE

Our analysis has implications for the optimal capital structure of a firm. To explore these implications, we consider an extension based on Liang and Zhang (2006), who consider a specific trade-off between debt and equity financing. Following the pecking-order theory of Myers (1984), these authors assume that debt is a less costly source of financing than equity. Bankruptcy costs counter this advantage of debt financing.[14] One example of such costs is auditing costs to prevent strategic defaults. When debtholders cannot directly observe the firm's success, the firm has an incentive to falsely claim not to be able to repay its debts. Contingent verification audits solve this problem. It gives the firm the right incentive to stay honest. However, in the case of an actual default, it leads to additional costs on debtholders.[15]

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[13] If this process does not converge, then an equilibrium interest rate r^* does not exist.

Let $r_e \in (0,1)$ represent the additional opportunity cost of one unit of equity. Similarly, let $c > 0$ denote the bankruptcy cost per unit of debt. As in Liang and Zhang (2006), bankruptcy costs are linear in debt size and incurred by the debtholders. In particular, debtholders who expect a probability of default k^e anticipate an expected return $(1 - k^e)rd - k^e cd$. Consequently, they demand the fair interest rate $r^* = k^e(1 + c)/(1 - k^e)$ in order to compensate them both for the risk of default and the extra bankruptcy cost c. Due to $e = 1 - d$, the investment value net of financing and bankruptcy costs is:

$$NPV_a(d) \equiv PV_a^*(d) - 1 - (1 - d)r_e - ck_a^*(d)d$$

under the accounting regime $a \in \{H,L\}$.

Because debtholders are compensated exactly for their opportunity costs, the firm's owners pick a debt level, d_a^*, that maximizes $NPV_a(d)$. For $r_e = 0$ the optimal debt level is 0, because equity has only advantages. Yet, when equity is sufficiently more costly than debt, the firm takes on a positive debt level. In particular, an internal optimal debt level satisfies the first-order condition:

$$k_a^*(d_a^*) = \phi_a(d_a^*) \tag{13}$$

where:

$$\phi_a(d) \equiv (PV_a^{*\prime}(d) + r_e)/c - k_a^{*\prime}(d)d$$

for $a \in \{H,L\}$.

The second-order condition, $NPV_a''(d) < 0$, is:

$$k_a^{*\prime}(d_a^*) > \phi_a'(d_a^*).$$

In the following, we assume that the first-order condition (13) has at most one internal solution $d_a^* \in (0,1)$ and that this solution satisfies the second-order condition. For the parameter constellation set out in Lemma 3 and 4, the following proposition shows that a firm takes on a larger debt level under historical cost accounting than under LCM accounting.

Proposition 6: Suppose interest rates are endogenous and $x_2 > 1/(2p_g - 1)$. Then the optimal debt level for a firm using historical cost accounting is larger than the optimal debt level for a firm using LCM accounting: $d_H^* > d_L^*$.

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[14] In contrast to Liang and Zhang (2006), our extension also goes through without any bankruptcy costs. For consistency, we nevertheless follow their assumption of strictly positive bankruptcy costs. Crucial, and in line with Liang and Zhang (2006), is a strictly positive opportunity cost of equity.

[15] See Gale and Hellwig (1985) for more details.

The proposition states that a firm using LCM accounting holds less debt than a firm using historical cost accounting. The result is due to two effects. First, Lemma 4 shows that the gross present value, *PV*, falls faster under LCM accounting than under historical cost accounting. The negative marginal effect of debt on the investment value is therefore larger under LCM accounting. In addition, Lemma 3 shows that the probability of default rises faster under LCM accounting. Hence, also the negative marginal effect on bankruptcy costs is larger. Both effects, therefore, tilt the trade-off between debt and equity financing more in favor of equity and make debt a less attractive option under LCM accounting.

Finally, we address the optimal accounting rule if firms choose their capital structure optimally according to the modeled trade-off. Due to the complexity of the equilibrium conditions for the risk of default Equations (10) and (11), we cannot obtain a closed-form solution of the optimal debt levels. Depending on the extra cost of equity r_e and bankruptcy cost c, any debt level may arise as an optimal debt level. In particular, higher debt levels are optimal when the cost of equity is large, whereas low debt levels are optimal when bankruptcy cost c is large. Despite these complexities, we obtain the following partial characterization of the optimal accounting rule from an efficiency perspective.

Proposition 7: Suppose interest rates are endogenous and $x_2 > 1/(2p_g - 1)$. Then there exists some debt level $\tilde{d} \in (0,\breve{d})$ such that whenever $d_H^* < \tilde{d}$ the investment value of a firm is larger under LCM accounting than under historical cost accounting: $NPV_L(d_L^*) > NPV_H(d_H^*)$. Moreover, there exists a debt level $\tilde{d}' \in [\tilde{d},\breve{d})$ such that for any $d_L^* > \tilde{d}'$ the investment value of a firm is smaller under LCM accounting than under historical cost accounting: $NPV_L(d_L^*) < NPV_H(d_H^*)$.

Intuitively, when the cost of bankruptcy is large relative to the extra cost of equity, the optimal level of debt, d_L^* and d_H^*, will be relatively small. As a result, the asset substitution problem plays only a minor role and LCM accounting is preferred on efficiency grounds. On the other hand, when the cost of equity is relatively large, the firm is, despite the asset substitution problem and the extra bankruptcy cost, better off using debt. For debt levels that exceed some critical level, Proposition 5 shows that opaque historical cost accounting leads to more efficient results than the more transparent regime of LCM accounting. The reason is that, under historical cost accounting, the asset substitution problem is less severe.

VII. CONCLUSION AND DISCUSSION

We develop a model to show that the asset substitution effect of debt is more severe under transparent accounting and that this negative effect can outweigh the usual positive effect of transparency. We compare two specific accounting regimes: pure historical cost accounting and the more conservative accounting regime of lower-of-cost-or-market (LCM). We confirm that in a market with asymmetric information, the two regimes lead to different degrees of transparency. Due to the asset substitution problem, the more transparent conservative LCM regime is preferred for low debt levels, whereas the opaque rule of pure historical cost accounting produces more efficient results for higher levels of debt.

To concentrate on the liquidity effect, we assume that the firm has to sell (or securitize) its assets if it wants to benefit from a later investment opportunity. In particular, it cannot raise capital in other ways such as issuing new equity or additional debt. Myers and Majluf

(1984) show, however, that a firm is better at raising new capital if there is less asymmetric information concerning its assets. Hence, in this case as well, transparent accounting exacerbates the asset substitution problem.

While we demonstrate our reasoning by comparing pure historical cost accounting versus the current GAAP regime of LCM, our results are ultimately driven by differences in transparency. Our analysis, therefore, has also implications for the current discussion about fair value accounting, one objective of which is to make accounting more transparent.[16] As we have shown, transparency and, therefore, fair value accounting itself can exacerbate the asset substitution problem. For two reasons, our results seem especially relevant for banks. First, banks are institutions with an extremely high degree of leverage. Second, banks hold mainly financial instruments for which the fair value option is farthest developed (e.g., FASB Statements No. 157 and 159).

The contribution of our model is to point out that accounting transparency exacerbates the asset substitution problem. Because the asset substitution problem impairs economic efficiency, it therefore provides an argument in favor of more opaque accounting. Yet, this is only a very narrow interpretation of our results. The literature provides many alternative mechanisms for dealing with the asset substitution problem. Taking this wider perspective, the current analysis argues that these alternative mechanisms become more important when accounting transparency is high. In particular, debtholders should be more concerned with the asset substitution problem when the firm uses more transparent accounting. For banks, where deposit insurance protects debtholders, regulatory agencies should pay more attention to the detrimental asset substitution effect with more transparent accounting measures.

APPENDIX

Proof of Proposition 1

To check existence, we first show that at a price $V = p_b x_1$ a firm with a good project does not want to sell its first project and reinvest. The payoff from holding on to the first project is $p_g x_1$. Selling the first project at the price $V = p_b x_1$ and reinvesting it in project 2 yields at most $p_b x_1 x_2$. Due to Assumption 1, this is strictly less so that a firm holding a good project does not want to sell it at a price $V = p_b x_1$. Moreover, a bad firm reinvests for j close enough to 1, as, due to $x_2 > 1$, it holds $p_b x_1 x_2 > p_b x_1$. Hence, at a price $V = p_b x_1$ only firms with bad projects and that observe a high j will offer their project to the market. Finally, in equilibrium the market's expectations are correct, i.e., it is aware that only bad projects are offered. With these rational expectations, the market is willing to pay at most $V = p_b x_1$. Q.E.D.

Proof of Proposition 2

By (1) and (2) and using $h_g^L = h_b^L = h_b^H = 1/x_2$, it follows that the difference between the expected present value of the firm's investment behavior under the two regimes equals:

$$\Delta PV = PV^L - PV^H = qp_g x_1 \int_{1/x_2}^{1} [hx_2 - 1]dh > 0.$$

The investment behavior under the transparent regime is efficient, because the firm swaps investments if and only if the swap raises the overall investment value. Q.E.D.

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[16] For more details on fair value accounting see FASB (2000) and Joint Working Group of Standard Setters (2000). Enria et al. (2004) offer a summary of the prevailing arguments in favor and against fair value accounting.

Proof of Proposition 4

It follows that:

$$\frac{\mathrm{d}PV^H}{\mathrm{d}d} = \frac{\partial PV^H}{\partial h_b^H}\frac{\partial h_b^H}{\partial d} = (1 - q)x_1p_b\underbrace{(1 - x_2h_b^H(d))}_{-}\frac{\partial h_b^H}{\partial d} < 0,$$

where the sign follows, because $h_b^H(d) = h_b^L(d)$ and by (6) we have $h_b^H(d) = h_b^L(d) \geq h_b^L(0) = 1/x_2$.

Moreover, we have:

$$\frac{\mathrm{d}PV^L}{\mathrm{d}d} = \frac{\partial PV^L}{\partial h_g^L}\frac{\partial h_g^L}{\partial d} + \frac{\partial PV^L}{\partial h_b^L}\frac{\partial h_b^L}{\partial d} = \frac{\partial PV^L}{\partial h_g^L}\frac{\partial h_g^L}{\partial d} + \frac{\mathrm{d}PV^H}{\mathrm{d}d}$$
$$= qx_1p_g\underbrace{(1 - x_2h_b^L(d))}_{+}\frac{\partial h_g^L}{\partial d} + \frac{\mathrm{d}PV^H}{\mathrm{d}d} < \frac{\mathrm{d}PV^H}{\mathrm{d}d} < 0,$$

where the signs follow, because by (4) we have $h_g^L(d) \leq h_g^L(0) = 1/x_2$. Q.E.D.

Proof of Lemma 1

For $d < (p_bx_1(x_2 - 1)(1 - k^e))/(1 - p_b)$ we differentiate (8) with respect to d after using (3), (5), (7), and the definition of $r^*(k^e)$. This yields:

$$\frac{\mathrm{d}k_L(d)}{\mathrm{d}d} = x_1^2\left(\frac{p_b^2(x_2p_b - 1)^2(1 - q)}{(x_1x_2p_b - d(1 + r))^3} + \frac{p_g^2(x_2p_g - 1)^2q}{(x_1x_2p_g - d(1 + r))^3}\right) > 0,$$

where the inequality holds due to $x_1x_2p_g > x_1x_2p_b > p_bx_1 > (1 + r)d$. For $d \geq (p_bx_1(x_2 - 1)(1 - k^e))/(1 - p_b)$ the second term in the brackets is 0 so that $\mathrm{d}k_L(d)/\mathrm{d}d$ is positive due to the first term only.

Likewise, for $d < (p_bx_1(x_2 - 1)(1 - k^e))/(1 - p_b)$ writing out $h_b^H(d,r^*(k^e))$ in (9) and a subsequent differentiation with respect to d yields:

$$\frac{\mathrm{d}k_H(d)}{\mathrm{d}d} = \frac{x_1^2p_b^2(x_2p_b - 1)^2(1 - q)}{(x_1x_2p_b - d(1 + r))^3} > 0,$$

where the inequality holds due to $x_1x_2p_b > p_bx_1 > (1 + r)d$. For $d > (p_bx_1(x_2 - 1)(1 - k^e))/(1 - p_b)$ we have $\mathrm{d}k_H(d)/\mathrm{d}d = 0$.

Finally, it holds:

$$\frac{\mathrm{d}}{\mathrm{d}d}(k_L(d) - k_H(d)) = \frac{x_1^2p_g^2(x_2p_g - 1)^2q}{(x_1x_2p_b - d(1 + r))^3},$$

which is strictly positive due to $x_1x_2p_g > x_1x_2p_b > p_bx_1 > (1 + r)d$. Q.E.D.

Proof of Lemma 2

Note that $h_g^L = 0$ and $h_b^L = 1$ implies, by (8), a default probability of:

$$\check{k}_L^* = q/2 + (1 - q)(1 - p_b)$$

so that the equilibrium interest rate is:

$$\check{r}_L^* \equiv \frac{\check{k}_L^*}{1 - \check{k}_L^*}.$$

Using (3) it follows for $\check{d}$ and $\check{r}_L^*$ that $h_g^L = 0$. Moreover, due to $p_b x_2 < p_g < 1$, we have $p_b x_1 x_2 - \check{d}(1 + \check{r}_L^*) = (p_b x_2 - 1)x_1 < 0$ so that, for any probability of success h, a bad firm obtains zero profits from reinvesting. Hence, it is an optimal strategy for the firm not to reinvest; $h_b^L = 1$. It follows that for $\check{d}$ we have an equilibrium interest rate such that a good firm always reinvests, $h_g^L = 0$, whereas a bad firm never reinvests, $h_b^L = 1$. Q.E.D.

Proof of Lemma 3

Because (11) implicitly defines k_h^*, we may use the implicit function theorem to determine $\partial k_H^*/\partial d$. Differentiating (11) with respect to d and a subsequent rearrangement of terms yields:

$$\frac{\partial k_H^*}{\partial d} = \frac{(1 - q)(h_b^H - p_b)\partial h_b^H/\partial d}{1 - (1 - q)(h_b^H - p_b)\partial h_b^H/\partial r \partial r^*/\partial k}. \tag{14}$$

Because $h_b^H(d) > p_b$ and $\partial h_b^H/\partial d > 0$ we have $\partial k_H^*/\partial d$ positive whenever the denominator in (14) is positive. For $d = 0$ we may explicitly calculate:

$$\left.\frac{\partial k_H^*}{\partial d}\right|_{d=0} = \frac{(1 - q)(1 - p_b x_2)^2}{p_b x_1 x_2^3 (1 - k_H^*(0))},$$

which is larger than 0. Hence, for $d = 0$ the denominator in (14) is positive. The sign of Expression (14) can only change if the denominator becomes negative and, since the denominator is continuous in d, this would require the denominator first to approach zero and violate $k^* \leq 1$. Hence, for the relevant domain, $\partial k_H^*/\partial d$ is increasing.

Similarly, we may differentiate (10) with respect to d and, after a rearrangement of terms, obtain:

$$\frac{\partial k_L^*}{\partial d} = \frac{q(h_g^L - p_g)\partial h_g^L/\partial d + (1 - q)(h_b^L - p_b)\partial h_b^L/\partial d}{1 - q(h_g^L - p_g)\partial r^*/\partial k \partial h_g^L/\partial r - (1 - q)(h_b^L - p_b)\partial r^*/\partial k \partial h_b^L/\partial r}.$$

Due to $h_g^L < p_g$, $\partial h_g^L/\partial d < 0$, $\partial h_g^L/\partial r < 0$, $\partial r^*/\partial k > 0$, it follows:

$$\frac{\partial k_L^*}{\partial d} > \frac{(1 - q)(h_b^L - p_b)\partial h_b^L/\partial d}{1 - (1 - q)(h_b^L - p_b)\partial r^*/\partial k \partial h_b^L/\partial r}. \tag{15}$$

According to (5) and (7) we have $h_b^L(d,r) = h_b^H(d,r)$ such that (14) and (15) differ only in the (omitted) argument $r_H^* = r^*(k_H^*) \neq r^*(k_L^*) = r_L^*$. Define for a given debt level d the function:

$$\beta(k) \equiv \frac{(1 - q)(h_b^L(d,r^*(k)) - p_b)\partial h_b^L/\partial d(d,r^*(k))}{1 - (1 - q)(h_b^L(d,r) - p_b)\partial r^*/\partial k(d,r^*(k))\partial h_b^L/\partial r(d,r^*(k))}$$

so that:

$$\frac{\partial k_H^*}{\partial \mathrm{d}} = \beta(k_H^*(d)) \text{ and } \frac{\partial k_L^*}{\partial \mathrm{d}} > \beta(k_L^*(d)). \tag{16}$$

The fact that $\beta(k)$ is increasing in k follows from $\partial h_b^L/\partial r > 0$:

$$\frac{\partial r^*}{\partial k} = \frac{1}{(1 - k)^2} > 0,$$

$$\frac{\partial^2 h_b^H}{\partial d^2} = \frac{\partial^2 h_b^L}{\partial d^2} = \frac{2p_b(1 + r)^2 x_1(1 - p_b x_2)}{(p_b x_1 x_2 - d(1 + r))^3} > 0,$$

and:

$$\frac{\partial^2 h_b^H}{\partial d \partial r} = \frac{\partial^2 h_b^L}{\partial d \partial r} = \frac{p_b x_1(1 - p_b x_2)(p_b x_1 x_2 + d(1 + r))}{(p_b x_1 x_2 - d(1 + r))^3} > 0.$$

Moreover:

$$k_H^*(0) = (1 - p_g)q + (1 - q)\left[\frac{1}{2}\left(\frac{x_2 - 1}{x_2}\right)^2 + \frac{1 - p_b}{x_2}\right]$$

and:

$$k_L^*(0) = q\left[\frac{1}{2}\left(\frac{x_2 - 1}{x_2}\right)^2 + \frac{1 - p_g}{x_2}\right] + (1 - q)\left[\frac{1}{2}\left(\frac{x_2 - 1}{x_2}\right)^2 + \frac{1 - p_b}{x_2}\right].$$

so that $x_2 > 1/(2p_g - 1)$ implies $k_L(0) > k_H(0)$ and, hence, $\beta(k_L(0)) > \beta(k_H(0))$. It then follows from (16) that for any $d > 0$:

$$\frac{\partial k_L^*}{\partial d}(d) > \beta(k_L(d)) > \beta(k_H(d)) = \frac{\partial k_H^*}{\partial d}(d).$$

Q.E.D.

Proof of Lemma 4

Define $r_a^*(d) \equiv k_a^*(d)/(1 - k_a^*(d))$. Lemma 3 together with $x_2 > 1/(2p_g - 1)$ implies $r_L^*(d) > r_H^*(d)$ for all $d \geq 0$.

Next we quantify the different terms in (12). In order to avoid confusion we explicitly write out the arguments of the different terms:

$$\frac{\mathrm{d}PV_a^*}{\mathrm{d}d} = \frac{\partial PV^a}{\partial d}\,(d,r_a^*(d)) + \frac{\partial PV^a}{\partial r}\,(d,r_a^*(d))\,\frac{\partial r^*}{\partial k}\,(k_a^*(d))\,\frac{\partial k_a^*}{\partial d}\,(d).$$

First, we have:

$$\frac{\partial PV^L}{\partial d}\,(d,r_L^*(d)) \leq \frac{\partial PV^H}{\partial d}\,(d,r_H^*(d)) \leq 0,$$

where the second inequality follows directly from Proposition 4 and the first inequality follows from:

$$\begin{aligned}\frac{\partial PV^H}{\partial d}\,(d,r_H^*(d)) - \frac{\partial PV^L}{\partial d}\,(d,r_L^*(d)) &= \frac{\partial PV^H}{\partial d}\,(d,r_H^*(d)) - \frac{\partial PV^H}{\partial d}\,(d,r_L^*(d)) \\ + \frac{\partial PV^H}{\partial d}\,(d,r_L^*(d)) - \frac{\partial PV^L}{\partial d}\,(d,r_L^*(d)) &= \left[\frac{\partial PV^H}{\partial d}\,(d,r_L^*(d)) - \frac{\partial PV^L}{\partial d}\,(d,r_L^*(d))\right] \\ - \int_{r_H^*(d)}^{r_L^*(d)} \frac{\partial^2 PV^H}{\partial d \partial r}\,(d,r)dr &\geq 0,\end{aligned}$$

where the inequality follows because, due to Proposition 4, the difference in the bracket terms is positive and the third term is negative due to:

$$\frac{\partial^2 PV^H}{\partial d \partial r}\,(d,r) = -\frac{dp_b^2(1-q)(1+r)x_1^2(p_bx_2-1)^2(2p_bx_1x_2+d(1+r))}{(p_bx_1x_2-d(1+r))^4} \leq 0.$$

Second:

$$\frac{\partial PV^L}{\partial r}\,(d,r_L^*(d)) \leq \frac{\partial PV^H}{\partial r}\,(d,r_H^*(d)) \leq 0. \tag{17}$$

The first inequality in (17) follows from:

$$\begin{aligned}\frac{\partial PV^H}{\partial r}\,(d,r_H^*(d)) - \frac{\partial PV^L}{\partial r}\,(d,r_L^*(d)) &= \frac{\partial PV^H}{\partial r}\,(d,r_H^*(d)) - \frac{\partial PV^H}{\partial r}\,(d,r_L^*(d)) \\ + \frac{\partial PV^H}{\partial r}\,(d,r_L^*(d)) - \frac{\partial PV^L}{\partial r}\,(d,r_L^*(d)) &= \left[\frac{\partial PV^H}{\partial r}\,(d,r_L^*(d)) - \frac{\partial PV^L}{\partial r}\,(d,r_L^*(d))\right] \\ - \int_{r_H^*(d)}^{r_L^*(d)} \frac{\partial^2 PV^H}{\partial r^2}\,(d,r)dr &\geq 0,\end{aligned}$$

where the inequality follows from Proposition 4 and because:

$$\frac{\partial^2 PV^H}{\partial r^2}\,(d,r) = -\frac{d^2p_b^2(1-q)x_1^2(p_bx_2-1)^2(p_bx_1x_2+2d(1+r))}{(p_bx_1x_2-d(1+r))^4} \leq 0.$$

The second inequality in (17) follows from:

$$\frac{\partial PV^H}{\partial r}(d,r) = \frac{d^2 p_b^2 (1 - q)(1 + r) x_1^2 (p_b x_2 - 1)^2}{(p_b x_1 x_2 - d(1 + r))^2} < 0.$$

Third:

$$\frac{\partial r^*}{\partial k}(k_L^*(d)) > \frac{\partial r^*}{\partial k}(k_H^*(d)) \geq 0$$

follows from:

$$\frac{\partial r^*}{\partial k}(k_L^*(d)) - \frac{\partial r^*}{\partial k}(k_H^*(d)) = \int_{k_H^*(d)}^{k_L^*(d)} \frac{\partial^2 r^*}{\partial k^2}(k)dk = \int_{k_H^*(d)}^{k_L^*(d)} \frac{2}{(1 - k)^3} dk > 0$$

and:

$$\frac{\partial r^*}{\partial k}(k) = \frac{1}{(1 - k)^2} > 0.$$

Finally:

$$\frac{\partial k_L^*}{\partial d}(d) \geq \frac{\partial k_H^*}{\partial d}(d) \geq 0$$

follows directly from Lemma 3.

After combining our observations about the four terms of (12) under the different accounting regimes the result follows. Q.E.D.

Proof of Proposition 6

First note that $x_2 > 1/(2p_g - 1)$ implies, due to Lemma 3 and Lemma 4, that $\phi_L(d) < \phi_H(d)$ for any $d \in (0,1)$.

The existence of a unique solution to the first-order condition (13) implies that $k_a^*(0) < \phi_a(0)$, because otherwise there exists some d such that $k_a(d) = \phi_a(d)$ and $k_a^{*\prime}(d) < \phi_a'(d)$, which violates the second-order condition.

Due to $x_2 > 1/(2p_g - 1)$, it follows $k_L^*(0) \geq k_H^*(0)$ and, using $k_L^{*\prime}(d) > k_H^{*\prime}(d)$, it then follows:

$$\begin{aligned} k_L^*(d_H^*) &= \int_0^{d_H^*} k_L^{*\prime}(\delta)d\delta + k_L^*(0) \\ &> \int_0^{d_H^*} k_H^{*\prime}(\delta)d\delta + k_H^*(0) = k_H^*(d_H^*) = \phi_H(d_H^*) > \phi_L(d_H^*). \end{aligned}$$

Hence, we have $k_L^*(0) < \phi_L(0)$ and $k_L^*(d_H^*) > \phi_L(d_H^*)$. Due to continuity, there must exist some $d' \in (0,d_H^*)$ such that $k_L^*(d') = \phi_L(d')$. Because d_L^* is the unique solution to $k_L^*(d) = \phi_L(d)$, we must have $d_L^* = d'$ and hence $d_L^* < d_H^*$. Q.E.D.

Proof of Proposition 7

First suppose $r_e = 0$ such that the optimal debt levels are 0: $d_L^* = d_H^* = 0$. In this case, $NPV_L(d_L^*) = PV_L(0) > PV_H(0) = NPV_H(d_H^*)$ so that LCM accounting yields a larger investment value.

Now consider the extreme $d_L^* \geq \breve{d}$. From Proposition 6 it follows $d_H^* \geq d_L^* \geq \breve{d}$. Lemma 2 establishes that for any debt level $d \geq \breve{d}$ we have $h_g^L = 0$ and $h_b^L = 1$ so that $PV_L^*(d) = \overline{PV}^L$ and $k_L(d) = k_L(\breve{d})$. Hence, $PV_L^*(d_H^*) = PV_L^*(d_L^*) = \overline{PV}^L$ and $k_L(d_L^*) = k_L(d_H^*)$.

Moreover, we may rewrite the first-order condition for an optimal debt level d_a^* as:

$$r_e - ck_a(d_a^*) = -PV_a^{*\prime}(d_a^*) + ck_a'(d_a^*)d_a^*.$$

and establish that, due to $PV_a^{*\prime}(d) < 0$ (Lemma 4) and $k_a'(d) > 0$ (Lemma 3), we have $r_e - ck_a(d_a^*) > 0$.

It therefore follows:

$$\begin{aligned}NPV_L(d_L^*) &= PV_L^*(d_L^*) - (1 - d_L^*)r_e - ck_L(d_L^*)d_L^*\\ &= \overline{PV}_L - r_e + d_L^*(r_e - ck_L(d_H^*))\\ &\leq \overline{PV}_L - r_e + d_H^*(r_e - ck_L(d_H^*))\\ &< PV_H^*(d_H^*) - r_e + d_H^*(r_e - ck_H(d_H^*)) = NPV_H^*(d_H^*),\end{aligned}$$

where the first inequality follows from $d_H^* \geq d_L^*$ and $r_e - ck_L(d_H^*) > 0$. The second inequality follows, because, due to $x_2 < 2$, we have, by Proposition 5, that $PV_H^*(d_H^*) \geq \overline{PV}_H > \overline{PV}_L$. Moreover, $k_L(d_H^*) > k_H(d_H^*)$.

Hence, we established that $NPV_L(0) > NPV_H(0)$ and if $d_L^* \geq \breve{d}$ then $NPV_L(d_L^*) > NPV_H^*(d_H^*)$. By continuity there must exist a $\tilde{d} \in (0,\breve{d})$ such that if $d_H^* < \tilde{d}$ then $NPV_L(d_L^*) > NPV_H(d_H^*)$. Finally, there must, by continuity, exist some $\tilde{d}' \in [\tilde{d},\breve{d})$ such that for any $d_L^* > \tilde{d}'$ we have $NPV_L(d_L^*) < NPV_H(d_H^*)$. Q.E.D.

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Is Self-Regulated Peer Review Effective at Signaling Audit Quality?

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ABSTRACT: This study examines whether peer reviews conducted under the AICPA's self-regulatory model have been effective at signaling audit quality. Prior research has examined whether peer-review reports are associated with *perceived* audit quality. We examine whether peer-review reports are associated with *actual* audit quality. Using a unique data set obtained from the files of an insurance company, we find that peer-review findings are indeed useful in predicting audit failure (i.e., malpractice claims alleging auditor negligence), and that certain types of findings are particularly useful in this regard. We also find that peer-review findings are associated with other firm-specific indicators of potentially weak quality control or risky practices within accounting firms. Taken together, we interpret our findings to indicate that self-regulated peer review as mandated by the AICPA does provide effective signals regarding audit-firm quality.

Keywords: *peer review; audit quality; litigation risk.*

Data Availability: *Accounting firm data from the insurance company files are available subject to approval of the insurance company. Summary data may be obtained from the authors upon request.*

I. INTRODUCTION

This study examines the effectiveness of the AICPA's self-regulated peer-review process. We specifically examine whether traditional peer-review reports are informative regarding the audit quality of accounting firms. Peer review has for many years been an integral part of the AICPA's program for enhancing quality in the auditing profession.

Helpful comments were received from Eddy Vaasen, Barry Lewis, Clive Lennox, and participants at the 2006 International Symposium on Audit Research. Special thanks also to the insurance company for allowing us access to their files for our study.

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Originally adopted in the 1970s, the intent of peer review was to improve audit quality *primarily* by identifying significant audit-firm weaknesses, and by communicating those weaknesses to the reviewed firms so they could take corrective action (White et al. 1988; AICPA 2004). It was clearly intended to be a forward-looking, rather than a punitive process.[1] However, the AICPA has recently recognized that regulators and the general public might also use peer-review reports for decision-making purposes (AICPA Peer Review Board 2004). This has led to a renewed emphasis on peer-review transparency, and to much debate regarding the information content of peer-review reports, including the disclosure of audit-firm weaknesses to the public (e.g., Bunting 2004; Snyder 2004). Implicit in this debate are the assumptions that many parties value audit-firm quality, and that peer-review reports provide information regarding such quality. Little is currently known about the validity of these assumptions.

In this study, we focus on the information content of the peer-review report itself. In order for peer review to impact audit quality, it must effectively identify weaknesses in lower-quality firms and communicate this information in the report. Without this, corrective action cannot be taken, and related market pressure cannot be brought to bear. Recent actions by regulators imply that self-regulated peer review has not been an effective mechanism in this regard. For example, the Sarbanes-Oxley Act of 2002 now requires audit firms with public clients to have PCAOB inspections regardless of their peer-review results (U.S. House of Representatives 2002). This change was clearly a reaction to the observation that most audit failures involved firms receiving clean (unmodified) peer-review reports. At that time, few empirical studies existed to shed light on the issue. In fact, little research to date has examined whether peer-review reports credibly capture audit-firm quality.[2] This is unfortunate since most audit firms continue to rely on self-regulated peer review to guide their quality-control efforts (Hilary and Lennox 2005).[3] Moreover, understanding peer-review effectiveness is imperative to the ongoing debate about the extent to which the auditing profession should be self-regulated.

Using a unique and proprietary data set obtained from the application files of an insurance company that provides liability coverage to accounting firms, we examine the link between peer-review reports and audit-firm quality. We first examine whether the detailed information communicated in the peer-review report—specifically the associated letter of comments (LOC)—is helpful in predicting audit failure. Using malpractice claims as evidence of audit failure, we find that the number of weaknesses identified in peer-review reports is associated with audit failure. We also find that some types of weaknesses identified in peer-review reports are helpful in predicting audit failure while others are not. We also examine whether the information contained in peer-review reports is calibrated with other potential firm-specific indicators of risk. Using information gathered by the insurance company specifically to aid in the assessment of audit-firm risk, we find that the number of weaknesses identified in peer-review reports is associated with such firm-specific attributes. We interpret our results to be generally supportive of self-regulated peer review being an effective mechanism for differentiating actual quality among audit firms—even among firms receiving clean (unmodified) peer-review reports.

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[1] The output from an AICPA peer review includes, (1) an overall report, which generally contains little or no specific information about quality-control weaknesses identified during the review, and (2) a letter of comments, which describes the specific quality-control weaknesses identified during the review, and which requires a written response. Until recently, these were not generally available to the public.

[2] Recent studies find PCAOB inspections to be associated with improved audit quality (e.g., Gunny and Zhang 2006; Hermanson et al. 2007; Lennox and Pittman 2007), but say little about the effectiveness of traditional AICPA peer reviews. This paper should help provide a basis for benchmarking current efforts at regulation against the strictly self-regulatory regime that existed prior to Sarbanes-Oxley.

[3] Peer review remains a requirement for AICPA membership—even for firms receiving PCAOB inspections. Because PCAOB inspections focus only on the audits of public clients, the AICPA allows members of its Center for Audit Quality (which replaced the SECPS in 2003) to have peer reviews that focus only on the other aspects of a firm's practice. Most states continue to require peer review for CPA licensure. Audit firms in many countries also have peer-review requirements similar to those maintained by the AICPA.

In the next section we discuss the background and objectives of peer review, and develop hypotheses regarding its ability to signal audit-firm quality. In Section III, we discuss our research method and data. Section IV presents the results of our hypothesis tests, followed by a summary and discussion of our results in Section V.

II. PEER REVIEW AND AUDIT QUALITY

The AICPA has for many years incorporated peer review as one of its primary methods of controlling quality among CPA firms. Even before mandatory peer review was adopted, the AICPA had a system of voluntary peer review that started in the 1970s. This was implemented primarily as part of the profession's response to a wave of audit failures that caused the public to question audit effectiveness. The voluntary phase of peer review eventually gave way to a form of mandatory, yet self-regulated, peer review that was instituted by the AICPA's membership in the late 1980s at the prodding of the SEC (Berton 1987; White et al. 1988). Self-regulated peer review has remained basically intact from that time until the present—even *after* the creation of the PCAOB in 2002. Although the creation of the PCAOB implied that self-regulation had failed in terms of monitoring, the AICPA recently reasserted its commitment to peer review for its membership (AICPA 2004), albeit in a more transparent form.

The effectiveness of the AICPA's peer-review program has often been questioned. While some commentators have been supportive of the program (e.g., Mautz 1984; Kaiser 1989; Felix and Prawitt 1993), critics have made reasonable arguments over the years as to why self-regulated peer review may not work. Some point to the anecdotal evidence that peer reviews identify relatively few weaknesses in reviewed firms (e.g., Wallace and Cravens 1994), that almost all peer-review engagements result in unmodified reports (e.g., Hilary and Lennox 2005), and that most audit failures involve peer-reviewed firms (e.g., Fogarty 1996). Others argue that peer review cannot be effective because of the general lack of independence among reviewers and reviewees (Anantharaman 2007; Grumet 2005), and because the formality of the process allows firms to develop explicit compliance plans based on charts and checklists that have little impact on the conduct of audits (Atherton 1989; Austin and Lanston 1981). Fogarty (1996) argues that the AICPA's peer-review program may be nothing more than "ceremonial logic" because (1) the program was created by a trade organization focused more on maintaining the profession's image than on improving audit quality, and (2) reviews focus on the quality-control process and documentation of that process rather than on the appropriateness of audit decisions and actual audit quality.

While these criticisms appear reasonable, the key to determining whether peer review is effective is to examine whether it successfully identifies quality differences among audit firms. In other words, do peer-review reports credibly reflect audit quality? Empirical studies have shed some light on this question, but most of this evidence is *indirect*. For example, studies examining *ex post* assessments of quality find that audit firms required to undergo peer review are associated with higher-quality audits (e.g., Deis and Giroux 1992; Giroux et al. 1995; Krishnan and Schauer 2000). On the other hand, studies using fees as a proxy for quality are less clear on this question. Francis et al. (1990) find no evidence that auditors subject to peer review are able to charge higher fees. However, Giroux et al. (1995) find that such firms may indeed charge higher fees, but not on a per-hour basis. Similarly, a survey by Schneider and Ramsay (2000) suggests that while loan officers claim to have more confidence in clients audited by peer-reviewed firms, they are not more likely to approve loans or offer lower interest rates for those borrowers.

Wallace (1991) is the first to examine the information contained in peer-review reports and related LOCs. She finds that 90 percent of reports filed during the 1980–86 period were unmodified, with an average of 3.47 weaknesses identified per engagement. She also finds that the number of weaknesses is invariant to the type of reviewer, type of reviewee, or year of review. Wallace (1991) interprets these findings as supporting the contention that peer review is effective in that it is not subject to moral hazard problems surrounding the choice of the reviewing firm. Hilary and Lennox (2005) examine reports filed during 1997–2003 and find that most reports continue to be unmodified (95 percent), and that the average number of weaknesses identified (1.12 per report) appears to have decreased considerably over time. Their primary contribution is to gauge the information content of peer-review reports by focusing on audit-market reactions to those reports. Their research design makes two assumptions: first, that audit clients *perceive* peer-review reports to reflect *actual* audit quality; and second, that any market reaction to peer-review reports is due to audit-clients' demand for audit quality. The authors find evidence that the audit market reacts to the information signaled by peer-review reports. Specifically, firms receiving unmodified reports without LOCs gain clients following the review, while firms receiving modified or adverse reports lose clients. Shifts in the audit market also appear to be related to the number of weaknesses identified in the LOC.

Hilary and Lennox (2005) is the most complete examination to date of the information content of peer-review reports. They demonstrate that peer-review reports are associated with *perceived* audit quality. However, whether peer review provides an effective signal of audit quality ultimately depends on whether its results are well calibrated with *actual* audit quality.[4] Unfortunately, audit quality is usually unobservable on specific audits (O'Keefe et al. 1994). Because of this, researchers generally use proxies for audit quality in their analyses. Such proxies often involve events suggestive of audit failure, such as restatements (e.g., Kinney et al. 2004), failure to issue going-concern reports (e.g., Lim and Tan 2008), the presence of AAERs (e.g., Hilary and Lennox 2005), and audit-related litigation (e.g., DeFond and Francis 2005; Francis 2004; Bonner et al. 1998). In this vein, we believe poor audit quality is observable with hindsight if an engagement results in litigation or a claim of malpractice against the audit firm (Palmrose 1988). That is, *ceteris paribus*, firms experiencing legitimate malpractice claims (i.e., audit failures) are likely to provide lower-quality audits on average. It follows that if peer-review reports accurately reflect *actual* audit quality, then such firms should generally have received weaker peer-review reports *prior* to the events leading to the claims. This leads to our first hypothesis:

> **H1:** The likelihood of audit failure (i.e., poor audit quality) is associated with peer-review findings.

This hypothesis reflects our belief that audit failure (as proxied for by a malpractice claim) is a reasonable indicator of poor audit quality. However, we recognize that not all audit failures result in observable events such as lawsuits or malpractice claims. We also recognize that the existence of audit risk allows that, statistically, some claims or lawsuits may be associated with high-quality auditors. For this reason, we also turn to insurance company expertise to identify other firm-specific attributes indicative of audit-firm risk and/ or lower average audit quality.

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[4] Hilary and Lennox (2005) indicate a *univariate* association between peer-review findings and Accounting and Auditing Enforcement Releases (AAERs). While AAERs are a reasonable proxy for audit quality, few firms in their study had clients subject to AAERs. Additionally, reviews of those firms appear to have been conducted *after* the SEC investigations had begun. Given the publicity surrounding SEC investigations, reviewing firms may have felt pressure to identify weaknesses in those cases.

During the application process, companies providing professional malpractice insurance to audit firms collect and carefully examine firm-specific information they consider useful in assessing the likelihood of claims or lawsuits being filed against potential clients. While such information about audit-firm attributes may also reflect risks not strictly associated with audit quality (e.g., clientele industry or jurisdiction), it is clear that audit-firm attributes indicative of lower audit quality would be associated with increased risk to the insurance company, and are likely to be captured in the client-screening process. It follows that if peer-review reports are informative about audit-firm quality, then they should also be associated with the attributes identified by insurance companies as being indicative of audit-firm risk/lower audit quality. This leads to our second hypothesis:

> **H2:** Peer-review findings are associated with the presence of audit-firm attributes indicative of audit-firm risk and/or lower audit quality.

III. RESEARCH DESIGN AND DATA COLLECTION

The data for this study are drawn from the proprietary files of an insurance company (the company) specializing in professional liability coverage for local and regional accounting firms. The company is a subsidiary of a large international professional services organization and is not publicly owned. It is subject to state regulation, reporting requirements, and inspection. It has been in existence for more than 20 years and sells directly to its clients, which range in size from small local firms to very large regional firms. Its clients include many of the largest accounting firms in the U.S. In fact, our sample includes 14 of the largest 100 CPA firms (Public Accounting Report 1999).[5] Access to the data was obtained through negotiations with the company, and provides us with at least three unique opportunities not available in prior research. First, we are able to use malpractice claims as a measure of audit failure. Most of the claims in our study are the product of litigation against the audit firm. While litigation is generally viewed as a reasonable proxy for audit quality (see Francis 2004), claims settled without litigation may represent additional incidents of audit failure that are generally not publicly observable. In fact, aside from nuisance claims, these may represent relatively egregious incidents of audit failure, since the allegations are not even challenged in court. Second, we are able to identify and use a considerable amount of firm-specific information not generally available to the public, including information about firm histories, clienteles, structures, and services. Because this data comes from the underwriting files of an insurance company, we are able to incorporate the company's expertise in our research design. Finally, accounting firms applying for coverage with this particular insurer are required to have peer reviews and must have received unmodified reports in their most recent review. The company's files contain copies of these reports, including the LOCs and associated responses.

In our primary analysis, we use the presence (absence) of an alleged audit failure as an indicator of lower (higher) audit quality. We first identify all audit-related claims involving accounting firms covered by the insurer during the period 1987–2000. Each observation represents a unique claim for deficient audit services for which the company made a nontrivial settlement (greater than $5,000).[6] This process yields 79 separate audit malpractice claims. A control group of 79 non-claim observations is constructed by matching each claim firm with an accounting firm having no audit-related malpractice claims. Non-claim firms are matched with claim firms according to size (total billings), and are required to have been covered by the insurance company during the same period (i.e., firms were matched on application year and size). In order to be considered a non-claim firm, the firm must have experienced no audit-related claims for the five years preceding the year of the observed claim.[7] The resulting sample includes 158 observations.

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[5] The largest accounting firms—including the Big 4 firms—are self-insured.

An accounting firm's underwriting application is updated once a year. The application contains information regarding the structure of the accounting firms, the services they provide, the nature of their clienteles, the professional activities of their owners, and some details regarding their recent histories. They contain no information about specific audit clients—including those associated with the incident leading to the malpractice claim. Our data come from the underwriting files for the two years prior to the claim. Data for the non-claim firms are drawn from the same calendar periods. Most of the data was hand-collected by a research assistant working directly under the supervision of one of the authors. The entire data set was then reviewed by a different author who had not been directly involved with initial data collection. Discrepancies were resolved by re-examination of the documents in the appropriate files.

Descriptive data for the peer reviews in our sample are presented in Table 1. The reports appear to be well distributed over the period 1986–1999 (see Panel A). The mean number of weaknesses identified in the reports for the 158 firms was 1.44 (see Panel B). This falls between Wallace (1991) and Hilary and Lennox (2005), and is consistent with a *gradual* decrease in weaknesses over time since peer review was implemented. The majority of weaknesses relate to engagement performance, with 87 firms receiving such findings (almost 1 per firm), followed by monitoring (29 firms, mean of 0.23 per firm) and personnel management (17 firms, mean of 0.13 per firm). Few firms in our sample have findings related to independence or client-acceptance issues.[8]

Table 1, Panel C presents the distribution of actual payouts on all audit-related claims filed with the insurance company. It is noteworthy that during the sample period, 125 (59 percent) of the 213 claims filed resulted in no payout, suggesting that the company does not simply settle claims to make them go away. On the contrary, the data suggest that the company identifies frivolous claims and denies them. The distribution of the remaining 88 firms does not suggest an obvious bias toward smaller claims. We are cautious, however, and eliminate the nine claims less than $5,000 from our sample. Taken together, the payout distribution appears to support our assertion that the claims in our sample do not represent

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[6] We exclude claims involving small dollar amounts because they are more likely to represent frivolous claims rather than genuine audit failures. We also exclude claims related to all nonaudit services. The company tracks claims regardless of whether they result from litigation. At least 56 of the 79 claims (71 percent) in our sample involved litigation.

[7] Applications specifically request claims information only for the five years prior to the application year. Matched firms were selected by insurance-company personnel who were not aware of the nature of the study.

[8] The peer-review reports contained in the files represent reviews performed *prior to* the year the claim was filed. Hence, it is unlikely that the reviewing firms felt pressure from these claims to identify weaknesses during their reviews (see footnote 4). In order to rule out the possibility that earlier claims may have impacted the reviews in our study, we reviewed the applications and identified all claim firms that had audit-related claims within the five-year period prior to the claim of interest (and prior to the peer-review date). The mean number of weaknesses identified in the peer-review reports for these five firms was not unusually high (1.20 versus the 1.44 mean for all firms). Sensitivity tests performed after omitting these firms and their matched counterparts yield results that are qualitatively similar to those reported here.

TABLE 1
Descriptive Peer-Review Information
(n = 158)

Panel A: Observations by Peer-Review Year

Year	Observations[a]
1986	13
1987	7
1988	9
1989	8
1990	17
1991	10
1992	18
1993	12
1994	8
1995	22
1996	13
1997	11
1998	8
1999	2
Total	158

Panel B: Peer-Review Findings

Type of Finding[b]	Mean	Median	Range of Findings	Observations with Comments
Total number of findings	1.437	1	0–9	100
Independence	.051	0	0–2	7
Client acceptance/continuance	.038	0	0–1	6
Personnel management	.127	0	0–3	17
Engagement performance	.987	1	0–5	87
Monitoring	.234	0	0–3	29

Panel C: Distribution of Claims by Dollar Amount

Payout Range[c]	Number of Claims
$0	125[e]
$0–4,999	9[e]
$5,000–24,999	12
$25,000–49,999	11
$50,000–99,000	13
$100,000–249,999	16
$250,000–499,999	15
$500,000–999,999	6
>$1,000,000	6
Total	213

(*continued on next page*)

TABLE 1 (continued)

Panel D: Distribution of Claims by Type

Allegation[d]	Total Claims	Claims in Sample
Failure to detect accounts receivable errors	9	3
Failure to detect departure from GAAP	2	1
Departure from GAAS	27	12
Failure to detect defalcation	58	24
Failure to issue GC report	4	1
Improper inventory evaluation	15	6
Failure to detect percentage-of-completion errors	1	1
Failure to detect related party transactions	2	1
Failure to detect under-/overstatement of liabilities	56	26
Other	39	4
Total	213	79

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[a] Observation year represents the year of the peer review. Odd numbers of observations occur because firms are matched on claim year rather than the year of their most recent peer review.

[b] Peer-review findings are identified directly from the letter of comments contained in the application files.

[c] Payouts represent the insurance company payouts rather than the amounts sought by claimants.

[d] Allegation categories are determined by the insurance company.

[e] Claims resulting in payouts of less than $5,000 are excluded from our sample as they are more likely to represent frivolous actions.

nuisance claims, but instead represent *bona fide* audit failures. The highest concentrations of alleged audit failure appear to involve failure to detect fraud and failure to detect misstated liabilities (see Table 1, Panel D).

IV. PEER REVIEW AND AUDIT FAILURE

Model Development

Hypothesis 1 states that peer-review findings are useful in predicting audit failure (low audit quality). To test this hypothesis, we estimate regression models linking peer-review variables to the presence or absence of malpractice claims alleging negligent, or low-quality, audit work. The dependent variable in the models (*CLAIM*) takes a value of 1 if a firm is subject to a malpractice claim, and 0 otherwise. Test variables reflect the findings described in the respective LOCs. Since peer-review findings apply to different aspects of an organization's activities, we examine them both in total (Equation (1)) and separated into the five quality-control categories (Equation (2)) used by the AICPA (1996):

$$CLAIM = a_0 + a_1 TOTFIND + \{\text{control variables}\} \quad (1)$$

$$CLAIM = b_0 + b_1 INDEP + b_2 ACCEPT + b_3 PERSNL + b_4 ENGAGE + \beta_5 MONITOR + \{\text{control variables}\} \quad (2)$$

where:

TOTFIND = total number of weaknesses identified in the peer-review report;

INDEP = dummy variable with a value of 1 if the peer-review report identifies at least one weakness related to *independence* policies, and 0 otherwise;

ACCEPT = dummy variable with a value of 1 if the peer-review report identifies at least one weakness related to *client acceptance* and continuation practices, and 0 otherwise;
PERSNL = dummy variable with a value of 1 if the peer-review report identifies at least one weakness related to *personnel management*, and 0 otherwise;
ENGAGE = dummy variable with a value of 1 if the peer-review report identifies at least one weakness related to *engagement performance*, and 0 otherwise; and
MONITOR = dummy variable with a value of 1 if the peer-review report identifies at least one weakness related to *monitoring* of professional practices, and 0 otherwise.

Equations (1) and (2) include control variables for non-quality factors likely to be associated with the likelihood of claims being filed with the insurance company. For example, while a link has been established between the size of a CPA firm and audit quality (e.g., Stice 1991), larger firms may experience more claims simply because they have more clients. To control for this possibility, we include the natural log of total fees for the firm in the year prior to the claim incident (*LNFEES*) and the percentage change in total audit firm staff in the year of the claim incident (*GROWTH*).[9] We also include the percentage of total firm fees coming from SEC clients (*SEC%*) to control for the likelihood that public audit clients are more litigious than nonpublic audit clients. We next include a dummy variable indicating whether a CPA firm is located in either Arizona or Texas (*JURIS*) to control for the possibility that claims are more likely in plaintiff-friendly jurisdictions (Esho et al. 2004).[10] Finally, to control for the possibility that CPA firms with low deductibles are more likely to file insurance claims, we also include a variable measuring the policy deductible divided by the number of firm owners (*DEDUCT*).

Results

Descriptive results for the 140 observations used to estimate Equations (1) and (2) are included in Table 2.[11] As expected, claim firms tend to have more total weaknesses (*TOTFIND*) than non-claim firms. They also tend to be slightly larger (*LNFEES*), have more SEC clients (*SEC%*), and are more likely to be found in plaintiff-friendly jurisdictions (*JURIS*). Correlation analysis (Table 3) reveals significant correlations among the types of weaknesses identified. Variance inflation factors are all less than 1.5, however, so multicollinearity is not a problem in the data.

Equation (1) includes a continuous test variable representing the total number of weaknesses identified in the peer-review report (*TOTFIND*). Results from the logit estimation are shown in Table 4, column A. The model has a pseudo-R^2 of 18.9 percent, and control variables are all significant as predicted. Claims are more likely for larger firms (*LNFEES*, $p < .001$), rapidly growing firms (*GROWTH*, $p = .044$), firms with more SEC clients (*SEC%*, $p = .090$), firms operating in plaintiff-friendly jurisdictions (*JURIS*, $p = .004$), and firms carrying smaller deductibles (*DEDUCT*, $p = .067$). More importantly, the likelihood

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[9] Replacing growth in staff with growth in total fees reduces our sample size to 114 due to missing data. However, it does not qualitatively alter our results.

[10] The insurance company insures accounting firms in most U.S. states. According to the company, legal precedent and court rules make it relatively easy to bring litigation against accountants in these states. In their experience, these two states have the most plaintiff friendly courts in the U.S.

[11] Nine pairs of firms (18 observations) were dropped because of missing data items for either the claim firm or the non-claim firm.

TABLE 2
Descriptive Data for Claim Firms (*CLAIM* = 1) and Non-Claim Firms (*CLAIM* = 0)
(n = 140)

	Non-Claim Firms n = 70			**Claim Firms n = 70**		
Variable	**Mean S.D.**	**Min.**	**Max.**	**Mean S.D.**	**Min.**	**Max.**
TOTFIND	1.00 1.19	0	4	1.47** 1.63	0	8
INDEP	0.01 0.12	0	1	0.04 0.20	0	1
ACCEPT	0.03 0.17	0	1	0.06 0.23	0	1
PERSNL	0.03 0.17	0	1	0.14** 0.35	0	1
ENGAGE	0.43 0.50	0	1	0.61** 0.49	0	1
MONITOR	0.17 0.38	0	1	0.11 0.32	0	1
LNFEES	14.18 0.92	11.05	16.18	14.85*** 0.80	13.039	16.58
GROWTH	0.06 0.10	0.00	0.57	0.07 0.14	0.00	0.67
SEC%	0.41 1.51	0.00	9.00	0.80* 1.51	0.00	5.00
JURIS	0.09 0.28	0	1	0.23** 0.42	0	1
DEDUCT	2951 2025	714	10000	2633 1655	833	833

***, **, * Indicates mean value is greater at p < .01, .05, and .10, respectively.

Variable Definitions:

TOTFIND (+) = total number of weaknesses identified in the peer-review report/LOC;
INDEP (+) = dummy variable with a value of 1 if the peer-review report identified at least one weakness related to independence, and 0 otherwise;
ACCEPT (+) = dummy variable with a value of 1 if the peer-review report identified at least one weakness related to client acceptance and continuance, and 0 otherwise;
PERSNL (+) = dummy variable with a value of 1 if the peer-review report identified at least one weakness related to personnel management, and 0 otherwise;
ENGAGE (+) = dummy variable with a value of 1 if the peer-review report identified at least one weakness related to engagement performance, and 0 otherwise;
MONITOR (+) = dummy variable with a value of 1 if the peer-review report identified at least one weakness related to monitoring, and 0 otherwise;
LNFEES (+) = natural log of total firm fees;
GROWTH (+) = percentage change in total audit firm staff in the year of the malpractice claim;
SEC% (+) = percentage of total fees from SEC clients;
JURIS (+) = dummy variable with a value of 1 if the firm practices in either AZ or TX, and 0 otherwise; and
DEDUCT (−) = deductible included in insurance policy divided by number of firm owners.

of audit failure is positively associated with the total number of weaknesses identified in the peer-review report (*TOTFIND*, p = .039).

Equation (2) examines whether the *type* of weakness identified in the peer-review report is informative regarding likely audit failure. We use dummy variables to indicate whether

TABLE 3
Correlation Matrix for Independent Variables in Equations (1) and (2)[a]
(n = 140)

	TOTFIND	*INDEP*	*ACCEPT*	*PERSNL*	*ENGAGE*	*MONITOR*	*LNFEES*	*GROWTH*	*SEC%*	*JURIS*
INDEP[b]	**0.539**									
ACCEPT	**0.529**	**0.387**								
PERSNL	**0.405**	**0.407**	0.061							
ENGAGE	**0.833**	0.078	**0.203**	0.038						
MONITOR	**0.524**	**0.175**	0.115	−0.052	**0.187**					
LNFEES	0.029	0.089	0.080	0.039	0.028	−0.110				
GROWTH	0.032	0.154	−0.058	**0.162**	−0.012	0.047	**−0.179**			
SEC%	0.058	0.016	0.055	−0.106	0.033	0.120	0.124	−0.040		
JURIS	−0.057	−0.074	−0.091	0.148	−0.058	**−0.176**	0.014	0.002	−0.105	
DEDUCT	−0.045	0.083	−0.057	−0.064	−0.066	−0.052	−0.038	**0.224**	0.022	0.079

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[a] Correlations with absolute values greater than or equal to .16 (bolded) are significantly different from zero at the .05 level.
[b] See Table 2 for variable definitions.

TABLE 4
Analysis of the Relation between Peer-Review Findings and the Likelihood of Audit Failure Using Logit
(n = 140)

Model A: $CLAIM^{b} = a_0 + a_1 TOTFIND + \{\text{control variables}\}$

Model B: $CLAIM = b_0 + b_1 INDEP + b_2 ACCEPT + b_3 PERSNL + b_4 ENGAGE + b_5 MONITOR + \{\text{control variables}\}$

	Predicted Sign[a]	A		B	
		Estimate	Wald χ^2	Estimate	Wald χ^2
Test Variables					
TOTFIND	+	0.27	3.12**		
INDEP	+			−0.46	0.08
ACCEPT	+			0.29	0.08
PERSNL	+			1.82	2.74**
ENGAGE	+			0.91	4.78**
MONITOR	+			−0.53	0.73
Control Variables					
Intercept		−15.37	17.13	−15.94	16.25
LNFEES	+	1.03	16.63***	1.05	15.48***
GROWTH	+	2.81	2.91**	2.62	1.95*
SEC%	+	0.18	1.79*	0.23	2.75**
JURIS	+	1.55	6.96***	1.41	5.32**
DEDUCT	–	−0.01	2.26*	−0.01	1.71*
Pseudo-R^2		18.9%		22.3%	
Log Likelihood		78.69***		75.45***	

***, **, * Indicates significance at $p < .01$, .05, and .10, respectively.

[a] All p-values are one-tailed where signs are predicted.

[b] Dependent variable (*CLAIM*) equals 1 if firm had an audit related claim filed against it, and 0 otherwise. See Table 2 for additional variable definitions.

a particular type of weakness is identified in the report. Results are shown in Table 4, Column B. The model has a pseudo-R^2 of 22.3 percent, and control variables continue to be significant as predicted. Results indicate the likelihood of audit failure is positively associated with some types of weaknesses identified in peer-review reports, but not others. Firms having weaknesses related to personnel management (*PERSNL*) and/or engagement performance (*ENGAGE*) are more likely to experience audit failure ($p = .049$ and $p = .014$, respectively), while firms having weaknesses related to independence (*INDEP*), client acceptance (*ACCEPT*), and/or monitoring (*MONITOR*) are not. We interpret the results of these two analyses as providing support for our first hypothesis that peer-review findings are informative as to *actual* audit quality—at least insofar that a malpractice claim is a reasonable proxy for poor audit quality. However, we suggest caution in interpreting our lack of results for *INDEP* and *ACCEPT* as relatively few firms in our sample received such comments.

We next perform a series of tests for sensitivity purposes. First, we estimate Equations (1) and (2) after omitting all the control variables except size. Second, we estimate Equation (2) using continuous count variables rather than indicator variables for each type of weakness. Third, although multicollinearity is not indicated, we estimate Equation (2) using one type of weakness at a time as the test variable. Fourth, we estimate both equations after omitting outliers (identified using SAS influence diagnostics). Finally, because larger claims are more likely to represent legitimate audit failures, we reformulate Equations (1) and (2) to include continuous measures of the dependent variable using the natural log of the actual dollar amounts of the malpractice claims. We perform this analysis using the entire sample, and using the sample after omitting observations with payouts in the lowest quartile. We use Tobit for these last two analyses since the dependent variable is both continuous and censored (Maddala 1983). In each of these analyses, the results are qualitatively similar to those in Table 4.

Finally, in order to address the concern that some peer-review comments may reflect client risk, we perform an additional series of sensitivity tests. First, since client-acceptance comments are the most likely type of comment to reflect client risk, we estimate Equations (1) and (2) after omitting observations having client-acceptance comments (and their matched counterparts). Results are qualitatively similar to those reported in Table 4. Second, although Equations (1) and (2) already include a variable to control for engagement risk (*SEC%*), we estimate the two equations using each of the other data items in the application files that provide information about clientele (see Table 5). These include indicators of clients in risky industries (*CLNTRSK*—in summary form, as well as broken down by individual industry), and indicators of unusually large clients (*LARGE%*—for the largest client and largest two clients). None of these variables is significant, and the test variables remain significant in all cases. Finally, LOCs are not detailed enough to identify specific engagements sampled and tested during peer review. Nevertheless, we review the descriptions of each of the 70 claims in our sample along with their respective LOCs to examine any cases where there are similarities (industry, type of weakness, etc.). We identify four such cases. We estimate Equations (1) and (2) after omitting these observations (and their matched counterparts). Results are qualitatively similar to those in Table 4.

V. PEER REVIEW AND AUDIT-FIRM ATTRIBUTES

Model Development

Hypothesis 2 states that peer-review outcomes are also associated with firm-specific attributes indicative of audit-firm risk or audit quality. We test H2 using data provided by the insured accounting firms during the application process. This firm-specific data contained in the applications is the primary input used by the insurance company to make business decisions. In order for us to use this data as being indicative of audit-firm risk/ audit quality, we make two important assumptions. First, in order for an insurance company to survive over time, it must possess a critical degree of expertise related to identifying applicant-specific attributes informative about risk. Such information is used to make decisions about: (1) insurability, (2) liability limits, and (3) premium and deductible amounts. Second, information about such attributes is most likely obtained through the application process.[12]

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[12] To provide some assurance regarding the reasonableness of these assumptions, we identify information in the files that reflects insurance-company decisions (premiums, deductibles, and liability limits) and regress this information (deflated by the number of audit-firm partners) against a dummy variable indicating a claim alleging audit failure or not. Significant coefficients on these variables would suggest that the decisions made by the insurance company using the application data are useful in predicting audit-firm risk. The coefficient on premiums is significantly positive ($p < .01$), consistent with the insurance company charging more for riskier clients. The coefficients on liability limits and deductibles are significantly negative, consistent with liability limits being be set lower for riskier clients ($p < .05$), and with riskier clients choosing lower deductibles ($p < .10$).

TABLE 5
Descriptive Data for Items in Insurance Company's Application Files[a]
(n = 154)

Variable	Mean	Std. Dev.	Min	Max
Continuous				
LNFEES	14.48	0.92	11.05	16.58
LARGE%	9.15	5.83	0.10	33.00
CLNTRSK	1.53	3.20	0	28.00
OWNER%	22.24	10.69	6.25	66.67
CPA%	50.48	12.54	12.50	83.33
INDBILL	$88,827	$26,619	$15,728	$181,496
SEC%	0.62	1.48	0	9.00
AUDIT%	29.33	16.69	1.00	95.00
MAS%	6.92	6.78	0	33.20
FIDUC	1.06	1.09	0	3.00
TXSHLT	0.23	0.60	0	3.00
DISCPL	0.18	0.61	0	5.00
CLAIMS	0.56	1.16	0	6.00
Discrete				
BUSFRM	39.61%			
MERGER	29.22%			
INVEST1	12.34%			
INVEST2	5.84%			
FININT	63.99%			
LITIGAT	30.52%			
SECPS	32.47%			
PCPS	55.20%			

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[a] Variables are taken directly from the application files, or are shown as ratios or transformations of data items taken directly from the application files. We are careful in our definitions not to reveal exact questions from the application files because of the proprietary nature of the information.

Variable Definitions:

LNFEES = natural log of total fees;
LARGE% = percentage of total fees coming from two largest clients;
CLNTRSK = percentage of total fees from financial institutions or entertainment companies;
OWNER% = number of partners/owners as percentage of total staff;
CPA% = number of CPAs as percentage of total staff;
INDBILL = total fees per individual staff member (total fees/total staff);
SEC% = percentage of total fees from SEC clients/engagements;
AUDIT% = percentage of total fees from providing audit services;
MAS% = percentage of total fees from providing MAS services;
FIDUC = number of fiduciary services provided to clients;
TXSHLT = number of tax-shelter-related services provided to clients;
DISCPL = number of investigations/disciplinary actions ever against firm/partners;
CLAIMS = number of claims related to any service during last five years;
BUSFRM = dummy variable with value of 1 if the applicant has a limited liability business form (e.g., partnership, limited liability partnership, limited liability corporation), and 0 otherwise;
MERGER = dummy variable with value of 1 if the applicant experienced a merger in the last 5 years, and 0 otherwise;
INVEST1 = dummy variable with value of 1 if the applicant provides investment advice to its clients, and 0 otherwise;
INVEST2 = dummy variable with value of 1 if the applicant actually invests client funds or makes decisions regarding client funds, and 0 otherwise;
FININT = dummy variable with value of 1 if the applicant provides services to any clients in which the firm or partner has a 10 percent financial interest, and 0 otherwise;
LITIGAT = dummy variable with value of 1 if the applicant has a policy of suing clients for delinquent fees, and 0 otherwise;
SECPS = dummy variable with value of 1 if the applicant is a member of the SECPS, and 0 otherwise; and
PCPS = dummy variable with value of 1 if the applicant is a member of the PCPS, and 0 otherwise.

We begin with all firm-specific data items in the insurer's application files. After excluding contact information, items with missing observations, and redundant items, our final database includes 21 different data items used by the insurance company to make risk assessments.[13] Descriptive data for these items is shown in Tables 5 and 6. The data items collected most consistently across time by the company can generally be classified into related groups. They tend to represent the size and structure of the firms (e.g., *LNFEES*, *OWNER%*, *BUSFRM*, *SECPS*), services provides by the firms (e.g., *AUDIT%*, *MAS%*, *TXSHLT*), clienteles (e.g., *LARGE%*, *CLNTRSK*, *SEC%*), client relationships (e.g., *FIDUC*, *FININT*, *LITIGAT*), and firm histories (e.g., *MERGER*, *DISCPL*, *CLAIMS*). It is likely that, over time, these particular data items have been identified by the company as being the most useful in quantifying risk.

Due to the relatively large number of explanatory variables—especially given our relatively small sample of audit firms—we follow Rajgopal et al. (2002) and Bushee (1998) in performing factor analysis to reduce the number of explanatory variables by identifying underlying common factors in the data. Using the maximum likelihood method (Johnson and Wichern 1992), we identify four factors with eigenvalues greater than 1 (see Table 7).[14] The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is 0.5852.[15] Schwarz's Bayesian criterion attains their minimum values at four common factors, indicating that there is little doubt that four factors are appropriate for these data (Schwarz 1978). Items loading on Factor 1 include audit-firm section memberships and the acceptance of SEC clients. This factor may indicate maturity and professionalism, but also more oversight and less conservative attitudes about risk. Items loading on Factor 2 indicate a number of nontraditional audit-firm activities, many of which involve client advocacy and even managerial decision making. This factor may suggest a blurring of independence standards among professionals. Items loading on Factor 3 reflect audit-firm structure, particularly in terms of experience/expertise and individual billing rates/productivity. Finally, items loading on Factor 4 seem to reflect audit-firm policies regarding growth and client acceptance, as well as involvement with litigation. Each of the four factors appears to have a quality aspect to it, but there is not an obvious mapping between the four factors and the five quality-control categories identified by the AICPA (1996). This is not surprising given the relatively high correlations among different types of quality control weaknesses (see Table 3). In other words, the five quality-control categories are not independent. For this reason, we examine the link between peer-review findings and the common factors representing firm-specific characteristics using the *total* number of weaknesses identified in the report as the dependent variable:[16]

$$\begin{aligned} TOTFIND = {} & c_0 + c_1 Factor1 + c_2 Factor2 + c_3 Factor3 \\ & + c_4 Factor4 + \{\text{control variables}\}. \end{aligned} \tag{3}$$

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[13] Some data items disappeared over time from the applications as the insurance company deemed them to be less relevant for risk assessment.

[14] Using the principal factor method for estimating factors produces similar results.

[15] The KMO is bounded by $-\infty$ and $+1$. A minimum KMO of 0.5 is necessary for factor analytic estimation (Kaiser 1970).

[16] Following the advice of Long (1997), we use ordered logit instead of OLS regression. The dependent variable (*TOTFIND*) ranges between 0 and 9. Use of OLS regression would assume that the intervals in the dependent variable are equal, which is not necessarily the case here. For example, the implications of an auditing firm having 0 comments versus 1 comment is not necessarily the same as an auditing firm having 8 versus 9 comments.

TABLE 6
Correlation Matrix for Independent Variables in Equation (1)[a]
(n = 154)

	LNFEES	*LARGE%*	*CLNTRSK*	*OWNER%*	*CPA%*	*INDBILL*	*SEC%*	*AUDIT%*	*MAS%*	*FIDUC*	*TXSHLT*
LARGE%[b]	**−.315**										
CLNTRSK	**.216**	−.149									
OWNER%	**−.508**	**.228**	−.016								
CPA%	−.097	.085	−.022	**.443**							
INDBILL	**.369**	.132	−.068	**.173**	**.235**						
SEC%	.149	.055	**.186**	−.043	.065	.131					
AUDIT%	.131	−.018	.076	−.147	−.078	−.059	.098				
MAS%	.153	−.010	−.056	−.094	−.109	.013	−.106	−.080			
FIDUC	**.231**	.047	−.030	.000	.127	**.236**	−.058	**−.200**	.023		
TXSHLT	**.202**	−.105	.057	−.133	−.038	.004	.076	.120	−.028	**.224**	
DISCPL	**.175**	−.154	−.024	−.093	−.041	−.056	−.031	−.101	.070	.150	.084
CLAIMS	**.380**	**−.217**	.071	−.131	−.020	.082	.054	.003	.016	.033	**.165**
BUSFRM	.084	.019	−.051	.029	.036	.065	.013	.047	.022	−.024	−.138
MERGER	**.208**	−.111	.095	−.089	.006	.011	−.017	.067	.013	−.012	−.036
INVEST1	**.167**	**−.167**	−.061	−.018	.021	**.198**	−.030	−.077	.112	**.195**	.150
INVEST2	**.237**	−.024	.072	−.063	.034	**.190**	.026	.126	−.014	**.264**	**.318**
FININT	**.219**	−.067	−.060	.000	.124	.114	.007	**−.169**	−.041	**.181**	**.231**
LITIGAT	**.218**	−.147	.099	−.094	.020	.049	.012	−.066	.007	−.014	.047
SECPS	**.366**	−.096	**.248**	−.142	−.000	.117	**.414**	**.164**	−.003	.010	.030
PCPS	**−.221**	−.075	−.135	.022	−.082	**−.183**	**−.303**	**−.161**	−.032	.018	.025

(*continued on next page*)

TABLE 6 (continued)

	DISCPL	*CLAIMS*	*BUSFRM*	*MERGER*	*INVEST1*	*INVEST2*	*FININT*	*LITIGAT*	*SECPS*
CLAIMS	.128								
BUSFRM	.073	−.074							
MERGER	−.021	**.266**	−.082						
INVEST1	.153	−.098	.060	−.111					
INVEST2	**.203**	.094	.025	.023	.159				
FININT	.133	**.223**	.043	.049	.083	.134			
LITIGAT	.041	**.286**	−.075	.132	.052	.075	**.274**		
SECPS	−.041	**.331**	.034	.042	−.049	−.055	.015	.113	
PCPS	.110	**−.260**	−.071	.091	−.019	.113	.012	.002	**−.770**

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[a] Correlations greater than .16 (in bold) are significantly different from 0 at the .05 level.

[b] See Table 5 for variable definitions.

TABLE 7
Factor Loadings Using Maximum Likelihood Method with Varimax Rotation

Variable[a]	Factor 1[b]	Factor 2[c]	Factor 3[d]	Factor 4[e]
SECPS	**0.928**	−0.028	−0.058	0.135
SEC%	**0.427**	0.016	0.006	−0.025
CLNTRSK	0.224	−0.016	−0.162	0.139
PCPS	**−0.843**	0.056	−0.080	0.067
INVEST2	−0.054	**0.529**	−0.028	0.060
FIDUC	0.021	**0.520**	0.129	−0.034
TXSHLT	0.025	**0.450**	−0.124	0.130
INVEST1	−0.009	**0.409**	−0.006	−0.141
FININT	−0.004	**0.335**	0.184	**0.321**
DISCPL	−0.071	0.298	−0.095	0.132
OWNER%	−0.095	−0.111	**0.667**	−0.188
CPA%	0.046	0.070	**0.618**	−0.032
INDBILL	0.181	**0.309**	**0.352**	−0.081
MAS%	0.003	0.054	−0.111	−0.029
AUDIT%	0.179	−0.076	−0.214	−0.055
CLAIMS	0.295	0.113	0.023	**0.584**
LITIGAT	0.055	0.107	0.044	**0.455**
MERGER	−0.025	−0.068	−0.006	**0.404**
BUSFRM	0.061	0.024	0.037	−0.146
LARGE	−0.020	−0.094	0.238	**−0.336**
Eigenvalue	10.49	1.74	2.00	1.72
Variance explained	65.7%	10.9%	12.6%	10.8%

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[a] Bolded factor loadings with absolute values greater than .3 indicate the variables within each factor most useful in describing the underlying common factor.

[b] See Table 5 for variable definitions.

[c] Factor 1 appears to represent professional memberships and clientele.

[d] Factor 2 appears to represent CPA firms' providing nontraditional, almost managerial-type services.

[e] Factor 3 appears to represent CPA-firm structure, primarily as linked to experience/expertise and productivity.

[f] Factor 4 appears to represent CPA-firm history.

Test variables in this model include the standardized factor scores computed using the factor loadings in Table 7. We also include three control variables in the model to address other issues that might affect peer-review outcomes. First, we include the natural log of a firm's total fees (*LNFEES*) separately in the model. We do this primarily because it is highly correlated with many of the data items in the application (see Table 6). In addition, larger firms have more resources to invest in quality control, and generally have more to lose by providing poor-quality services to their clients (DeAngelo 1981). Second, we include a dummy variable in the model indicating whether the offices of the reviewing and reviewed firms are more than 100 miles apart (*DISTANCE*). This variable controls for the possibility that when the reviewer and the reviewee are competitors, the reviewer's objectivity may be compromised, leading to relatively harsh reviews (Hilary and Lennox 2005). Finally, we include *YEAR* in the model to control for the steady decrease in peer-review findings over time (Colbert and Murray 1998). Controlling for year allows us to abstract from the possibility that this observation may be related to changes in peer-review quality during that time.

Results

Results of the ordered logit estimations for Equation (3) are presented in Table 8. The model is significant at $p < .001$, but only two of the three control variables are significant in their predicted directions. *LNFEES* is significantly negative ($p = .039$), suggesting that larger audit firms may indeed invest more in quality-control systems. *YEAR* is also highly significant ($p < .001$), consistent with the observed decreases in the average number of peer-review comments over time. Interestingly, the coefficient on *DISTANCE* is not significant ($p = .355$), suggesting that the peer-reviews in our sample are invariant to whether the firms involved are competitors. This result is consistent with Wallace (1991) rather than Hilary and Lennox (2005).

Results for our test variables are generally consistent with peer-review results being associated with firm-specific indicators of audit-firm risk/audit quality—at least insofar as we can interpret our factor scores as representing those underlying attributes. First, mature firms that belong to practice sections, but that also tend to be less conservative regarding the acceptance of audit clients (*Factor1*) tend to have more weaknesses identified in their peer-review reports ($p = .035$, two-tailed). This result is difficult to interpret as it may indicate either lower audit quality or more stringent peer reviews for SECPS members.

TABLE 8

Analysis of the Relation between Peer-Review Findings and Firm-Specific Attributes Indicative of Lower Audit Quality Using Ordered Logit

(n = 154)

Model: $TOTFIND^{b} = c_1 Factor1 + c_2 Factor2 + c_3 Factor3 + c_4 Factor4 + \{\text{control variables}\}^{c}$

	Predicted Sign[a]	Estimate	Wald χ^2
Test Variables[d]			
Factor1		0.369	4.43**
Factor2		0.479	4.16**
Factor3		−0.403	3.88**
Factor4		0.141	0.32
Control Variables			
LNFEES	−	−0.401	3.08**
DISTANCE	−	−0.321	0.86
YEAR	−	−0.217	16.21***
Model χ^2			31.55***

***, ** Indicate significance at $p < .01$ and $p < .05$, respectively.

[a] All p-values are one-tailed where signs are predicted, two-tailed otherwise.

[b] *TOTFIND* is the total number of peer-review comments identified in the peer-review report. *LNFEES* is the natural log of total fees for the firm. *DISTANCE* is dummy variable indicating whether the reviewing firm is more than 100 miles away from the reviewed firm. *YEAR* represents the peer-review year. See Table 5 for additional variable definitions.

[c] Intercepts are omitted from the table for convenience.

[d] *Factor1–Factor4* are the standardized factor scores computed using the factor loadings in Table 7.

Second, firms that engage in activities that demonstrate a general blurring of independence between them and their clients (*Factor2*) also tend to have more weaknesses identified in their peer-review reports (p = .042, two-tailed). This result is more readily attributable to lower audit quality. Third, firms with relatively high experience levels (*Factor3*) tend to have fewer weaknesses identified in their peer-review reports (p = .049, two-tailed). This is also relatively easy to attribute to differences in audit quality among the applicants. Finally, *Factor4* does not appear to be directly related to peer-review results.[17] Together, these results are consistent with the notion that peer-review outcomes are associated with firm-specific attributes indicative of riskiness and/or audit quality.[18]

VI. SUMMARY AND CONCLUSIONS

The purpose of this study is to examine the effectiveness of the AICPA's voluntary peer-review regime for accounting firms that perform audits. Despite current PCAOB rules in the U.S. requiring auditors of public registrants to be inspected by the PCAOB, most firms still operate under a self-regulated peer-review system. It is also possible that the rush to impose mandatory inspections following the accounting scandals in the U.S. may not have adequately considered the effectiveness of self-regulated peer review in the wake of demands for reform. We contribute to this debate by examining whether peer reviews in a self-regulatory regime are informative regarding audit-firm quality. First, we examine whether the information in peer-review reports in the form of reviewer comments are associated with audit failure. We find that there is a predictable link between the number of weaknesses identified in a firm's peer-review report and the likelihood of that firm having a malpractice claim filed against it. We also find that the type of weakness identified in the report is relevant to predicting audit failure. Second, we examine the relationship between the number of weaknesses in peer-review reports and various firm-specific indicators of risk/quality. We find a similar link among these variables. Taken together, we interpret these findings as supporting the hypothesis that peer-review reports under the AICPA's self-regulated system provide reliable signals as to the *actual* quality of an audit firm. These results complement previous studies showing a link between peer review and *perceived* audit-firm quality (Hilary and Lennox 2005). They are also encouraging and supportive of the effectiveness of a self-regulatory peer-review regime.

We acknowledge several limitations in our study. First, while we interpret our results to indicate that peer-review outcomes are associated with actual audit quality, we (like other researchers) use various proxies for quality (e.g., audit failure and firm-specific attributes identified by risk experts). Although we believe these measures are reasonable, to the extent that they ultimately turn out to be poor proxies for quality, our results overstate the information content of peer-review reports. Second, while factor analysis is a common tool used in auditing research—and appears reasonable in this case—it does require judgment in interpreting the underlying common factors. Our interpretations imply certain assumptions regarding insurance company expertise and the information gathered during the application process. While we believe these assumptions to be reasonable, our analyses are essentially joint tests of the hypotheses and the assumptions. Third, the number of weaknesses identified in peer-review reports is low. This does not allow for much variation in our analyses and less power in our tests than we would like to have. Indeed, we hesitate to draw any conclusions about the fact that only two types of weaknesses are significantly related to malpractice claims since incidences of two of the other weakness types are quite low. Fourth, the audit firms in our study are all insured by the same company. This is sure to result in some level of homogeneity in the firms. We see this as interesting in some aspects. For example, all the firms received unmodified peer-review reports. This allows us to note differences in quality even among firms receiving clean opinions. On the other hand, this also excludes the largest firms (that self-insure), and to some degree limits our ability to generalize our findings.

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[17] Factor 4 is highly correlated with *YEAR*. When we estimate Equation (3) without including *YEAR*, the coefficient on Factor 4 is positive and highly significant (p = .003). This suggests that the common factor represented by Factor 4 reflects areas where audit-firm risk has been reduced over time—perhaps because of peer review, or perhaps due to increased monitoring by insurance companies.

[18] For sensitivity purposes, we also estimate Equation (3) using OLS and Poisson regression. In each case, the results are qualitatively similar to those reported in the paper.

Finally, we make no assertions from our study as to whether a voluntary regime is *more* effective than a mandatory regime. Indeed, a mandatory inspection regime may serve different purposes than professional peer review, and there are many benefits to a mandatory regime such as universal application, greater independence in the inspection process, and the potential for a more in-depth examination. On the other hand, we note that a mandatory regime involves significant costs to society and markets (Stigler 1971), and that the benefits of a voluntary regime may be underestimated—especially in the wake of the notorious audit failures in recent years. Our results suggest that the benefits of the voluntary regime may have been more extensive than generally believed. Regulators may find these results useful as part of their continuing oversight of the peer-review process. We believe additional research into the effectiveness of the self-regulatory model is needed to cast light upon, and aid in the continued scrutiny of, the auditing profession.

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Transient Institutional Ownership and CEO Contracting

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ABSTRACT: Prior research documents that CEOs respond to transient ownership preferences by choosing actions to meet short-term earnings targets. This study examines whether contract designers anticipate these actions and respond by adjusting explicit CEO compensation contracts. We find that, in determining CEO cash bonuses, firms with high levels of transient investors, on average, place a relatively low weight on earnings and a relatively high weight on annual returns. Additionally, both the likelihood of granting equity and the magnitude of annual equity grants to CEOs are higher with a higher level of transient investors, after controlling for previously studied determinants of equity grants. The results suggest transient-owner trading behavior creates implicit incentives for CEOs to take actions that increase current earnings, and firms take these implicit incentives into account in the design of explicit CEO compensation contracts.

Keywords: *CEO compensation; institutional ownership; incentive contracts; equity grants.*

JEL Classifications: *G30; J41; M41; M52.*

Data Availability: *Data used for this study are derived from publicly available sources.*

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I. INTRODUCTION

Prior research shows that institutional investors play an important monitoring role by encouraging and/or inducing higher overall pay-for-performance in compensation contracts (Almazan et al. 2005; Hartzell and Starks 2003). However, institutional investors are not all alike; while *dedicated* institutional investors have a long investment horizon, *transient* investors have a short horizon, as indicated by their high portfolio turnover and extensive use of earnings momentum trading strategies (Bushee 1998). Further, the complex dynamics involved between transient investors and firm contracting choices are not well understood. In this study, we take a first step in understanding these dynamics by investigating the relation between the composition of the institutional investor base and CEO contracting choices. Specifically, we examine the relation between transient institutional ownership and contracting choices related to the sensitivity of cash bonus to short-term earnings, the sensitivity of cash bonus to annual returns, and the magnitude of incentive equity grants.

Prior research documenting a positive association between transient ownership and managerial behavior (Bushee 1998; Matsumoto 2002) yields an important inference: Transient owners may provide motivation for CEOs to take actions that deliver current earnings in excess of expectations. We classify such motivation as an implicit incentive: an incentive that relies more directly on labor market forces for enforcement, rather than on the legal system, i.e., as is the case for contracts (Gillan et al. 2006). Thus, transient investors create implicit incentives for CEOs to over-allocate effort toward improving current earnings, potentially at the expense of creating long-term value. What prior work leaves unclear is whether, and how, these implicit incentives are considered in the design of CEO contracts by the compensation committee (hereafter, the firm).

We examine whether firms make contracting choices that reallocate CEO effort away from short-term earnings and toward long-term value creation. The percentage of shares held by transient institutional investors is our proxy for the strength of the transient-induced implicit incentives on current earnings. We find that, *on average*, the contracting weight placed on earnings in CEO cash bonus compensation decreases, and the contracting weight on annual returns increases, as the level of transient ownership increases. For example, a firm with transient ownership of 26 percent (3rd quartile) has a contracting weight on earnings (returns) that is 11 percent lower (19 percent higher) than the contracting weight for an otherwise comparable firm with transient ownership of 8 percent (1st quartile). These results hold after controlling for the effects of other factors previously shown to influence pay-for-performance sensitivity, including growth opportunities, CEO career horizon, CEO tenure, performance measure noise, CEO equity ownership, and negative earnings.

Given the relatively small magnitude of incentives provided by cash compensation as compared to incentives provided by equity compensation (Core et al. 2003), we further consider the possibility that a shift in cash bonus incentive weights from earnings to annual returns is insufficient to adjust completely for transient-induced implicit short-term incentives. Core and Guay (1999) model optimal equity portfolio holdings and show that firms adjust annual equity grants through time to rebalance the CEO holdings to the optimal level. They further document that variables capturing cash and earnings constraints create incremental demand for equity incentives over and above the rebalancing objective. We predict and find that high levels of transient ownership likewise are associated with an incremental demand for equity incentives. In particular, a firm with 1 percent larger transient ownership (e.g., 18 rather than 17 percent transient ownership) is associated with a 0.37

percent increase in the probability of granting equity. Further, a firm with 1 percent larger transient ownership grants approximately 5.4 percent more equity incentives. That is, controlling for the rebalancing objective, a positive association exists between the level of transient ownership and both the likelihood of granting equity and the magnitude of annual equity grants.

This study contributes to the extant literature in three ways. First, we show that implicit incentives created by transient investors are incorporated into the design of CEO incentive compensation. Prior research demonstrates empirically the creation of transient-induced implicit incentives to manage earnings (e.g., to cut R&D projects when firms near an earnings decline). Our research demonstrates that those implicit incentives are systematically associated with compensation contract design. Second, we show that, although cash-based incentives may be small relative to equity-based incentives, firms use cash bonuses (in conjunction with equity incentives) to mitigate the short-term incentives induced by a transient investor base.

Third, prior research indicates that institutional investors strengthen corporate control by influencing and/or otherwise inducing firms to increase overall pay-for-performance sensitivities (Hartzell and Starks 2003). Our research illustrates that transient institutional investors differ from long-term investors and, in fact, are associated with a decline in the pay-for-performance sensitivity of earnings. Note, however, that this decline in pay-for-performance sensitivity to earnings does not necessarily indicate a weakened control environment; the lower compensation incentives are designed to mitigate excessive implicit incentives (induced by the presence of transient investors) for earnings-focused decision-making. Thus, we contribute to a growing literature that investigates the impact of heterogeneity in firm ownership on corporate control practices (Hartzell and Starks 2003; Shin 2008).[1]

Section II below develops the hypotheses we test. Section III details the sample selection, the measurement of variables, and descriptive statistics. Section IV presents the empirical methodology and empirical results for the cash bonus analysis (H1a and H1b). Section V presents the empirical methodology and empirical results for the equity analysis (H2a and H2b). Section VI concludes.

II. HYPOTHESIS DEVELOPMENT

The Dynamics of the Relation between Investor Type and Contracting Choices

Institutional owners play an important role in managerial control via monitoring activities (e.g., Almazán et al. 2005; Gillan and Starks 2000), proposals and votes (e.g., Brickley et al. 1988), and share trading (e.g., Parrino et al. 2003). However, institutional investors vary, not only in their direct monitoring efforts, but also in their investment horizons. Bushee (1998) studies the investment horizon of institutional investors by empirically classifying institutional investors as transient or long-term based on their past trading behaviors. He finds that long-term investors (including both dedicated and quasi-indexers; hereafter, long-term investors) make highly concentrated investments, have low turnover, and exhibit little trading sensitivity to current earnings. Transient institutional investors, on the other hand, exhibit high portfolio turnover, extensive use of earnings momentum trading strategies, and relatively high portfolio diversification.

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[1] In concurrent research, Shin (2008) investigates the association between institutional investor horizon and CEO compensation design. He finds that (1) the proportion of stock-option compensation (relative to total compensation) and (2) stock-option pay-for-performance sensitivity are both increasing in the level of short-horizon owners, and CEO bonus pay reductions arising from negative earnings surprises are stronger for firms with high levels of short-horizon owners. By contrast, our study investigates whether transient ownership is associated with (1) a shift in weight from earnings to returns in annual bonus contracts and (2) the likelihood and magnitude of total, rather than option-based, equity grants.

As previously noted, the dynamics of the association between institutional investor type and CEO contracting choices are complex. Different forces can be at play, sometimes simultaneously. On the one hand, investors may directly *influence* the actions of the firm with respect to CEO contracting. On the other hand, there may be an *attraction* of certain types of institutional investors to firms with specific contracting characteristics. Finally, there may be a contracting choice *reaction* by the firm to the presence of transient investors. We consider each of these in turn.

First, investors may *influence* a firm's contracting choices. Investors may directly influence the choices by the firm with respect to CEO contracting by submitting shareholder proposals and sitting on the board. Indeed, Hartzell and Starks (2003) show that changes in institutional investor concentration lead to changes in pay-for-performance sensitivity, but the reverse is not true. It is unlikely, however, that this contracting influence is exerted by transient institutional investors. Because transient investors, by definition, hold stocks for short periods of time, they will not invest in those direct monitoring and influence activities documented by Hartzell and Starks (2003).[2]

Second, there may be an *attraction* of certain types of institutional investors to firms with specific contracting characteristics. Just as different types of institutional investors have preferences regarding various firm characteristics such as dividend yield and stock liquidity (Bushee 2001), transient investors might be attracted to firms with higher levels of earnings pay-for-performance sensitivity. Indeed, Shin (2008) shows that the concentration of transient investor ownership is positively related to the portion of CEO compensation that is equity-based. While the *attraction* of transient investors to firms with specific contracting methods is not the focus of this study, we do not rule this out as a possibility. Rather, we control for this element in the design of our empirical tests.

Third, there may be a contracting choice *reaction* by the firm based on the composition of the investor base. We assume that firms are aware of the composition of their investor base, or at least aware of firm characteristics that are likely to attract certain types of investors (consistent with the attraction theory described above). Accordingly, we posit that CEO contracts will reflect firm reactions to the investor base and, in particular, to the presence of high levels of transient institutional investors. This is the primary focus of our study. In particular, we examine whether firms react to increased transient ownership by making contracting choices that mitigate transient-induced implicit incentives to focus on short-term accounting earnings. We describe our hypothesized contracting reactions in the next section.

Hypotheses

We assume that, on average, a firm maximizes financial returns by using a combination of explicit and implicit incentives to induce an optimal allocation of managerial effort to both short-term and long-term projects. Accordingly, as long as (1) transient investors trade on current earnings, (2) the CEO has implicit incentives to react to this type of trading, even in the presence of a rational market, and (3) CEO explicit incentives are designed efficiently, then there should be a link between the presence of transient investors and the design of explicit incentive contracts. We expand on these three assertions, in order, below.

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[2] For a subsample of firms, we collect board member affiliations. No board members are also found to be transient institutional investors.

First, to support the assertion that transient investors trade on current earnings, we note that Bushee (1998, 2004) documents that transient investors make greater use of earnings momentum trading strategies than other groups of institutional investors. Additionally, trading by transient investors (as compared to trading by investors classified as "dedicated" or "quasi-indexers") is found to be the most sensitive to current earnings news. Ke and Petroni (2004) further show that transient investors buy heavily during strings of earnings increases and sell the stock when a break in the string becomes imminent.[3]

Second, Porter (1992) asserts that CEOs of firms with high levels of transient ownership sacrifice long-term investment to avoid a decline in current earnings. Bushee (1998) tests this assertion and documents that CEOs of firms with high levels of transient investors are more likely to make income-increasing cuts in research and development expenditures to avoid an earnings decline.[4] Moreover, Stein (1989) illustrates that managerial myopia can occur even in the presence of a rational, efficient stock market. In Stein's model, earnings are associated with firm value (i.e., stock price) and are used as a "signal" of this value. Given this association, managers will try to bolster the earnings in order to improve the signal that is conveyed to stock market participants. In an efficient market, the market will not be fooled by these actions and will back out these earnings increases when assessing firm value. However, Stein (1989) argues that, similar to players in a prisoner's dilemma, managers continue to act myopically and, anticipating this situation, the market continues to discount the reported earnings numbers. The result is that managerial myopia can persist, even in a rational market. Stein (1989, 655) states that "the more managers are concerned about current share prices, the worse the problem becomes."

Third, we conjecture that firms will consider the earnings trading behavior of transient investors when designing explicit incentive contracts. More specifically, similar to the trade-off between explicit contractual incentives and career-based implicit incentives (e.g., Fama 1980; Gibbons and Murphy 1992; Holmstrom 1999), we expect that firms will trade-off explicit contractual incentives with transient-induced implicit incentives. The purpose of these trade-offs is efficient contract design; the board elicits the optimal allocation of effort between generating or otherwise preserving short-term earnings and increasing long-term firm value (e.g., investing in new projects).

We examine how three different contracting choices differ depending on the strength of implicit incentives created by the presence of transient investors (measured as the percentage of shares held by transient institutional investors). The specific contracting choices we examine are the sensitivity of cash bonus to short-term earnings, the sensitivity of cash bonus to annual returns, and the granting of equity incentives (including restricted stock and options).

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[3] While not central to our argument, prior research has documented that mispricing consequences can also arise from transient trading behaviors. Bushee (2001), for example, documents that the concentration of transient investors is positively (negatively) associated with the amount of expected short-term (long-term) earnings impounded in stock price. Subsequent papers by Collins et al. (2003) and Ke and Ramalingegowda (2005), however, present evidence that returns to trading strategies exploiting the accrual and post-earnings-announcement drift anomalies are lower for firms with high levels of transient ownership, suggesting these firms are associated with less mispricing than are other firms.

[4] Matsumoto (2002) further shows that managers of firms with high transient ownership are also more likely to meet or exceed earnings expectations on a consistent basis. To the extent that investment decisions such as R&D reductions are used as the vehicle to meet forecasts, Matsumoto (2002) provides further evidence that transient investors create incentives to avoid current earnings declines.

We first predict that, in the presence of high transient ownership, firms will refocus the CEO on taking actions that create long-term value by reducing the sensitivity of the cash bonus to earnings.[5] In general, cash bonus is based on firm performance and is the form of compensation most frequently and closely tied to accounting earnings (Hall 1999). Thus, cash bonus provides a direct means of emphasizing or de-emphasizing earnings performance. By reducing internal contracting incentives directed toward current earnings, the firm offsets the transient-induced implicit incentives to increase current earnings. Thus, we predict that the incentive weight placed on earnings in cash bonus contracts will decrease as the level of transient ownership increases.[6] Stated formally:

> **H1a:** Firms with high transient institutional ownership will place *less* weight on accounting earnings in annual cash bonus contracts relative to firms with low transient institutional ownership.

To shift CEO focus away from current earnings and toward long-term performance, firms can also increase the sensitivity of the cash bonus to annual returns. Annual returns impound not only the short-term performance effects of current earnings but also the long-term effects of other business decisions (e.g., R&D expenditures) that may not have an impact on accounting earnings in the current period (Lev and Sougiannis 1996). Accordingly, we also predict that firms with high levels of transient ownership will increase the incentive weight on annual returns in the cash bonus contract. Stated formally:

> **H1b:** Firms with high transient institutional ownership will place *more* weight on annual returns in annual cash bonus contracts relative to firms with low transient institutional ownership.

It is unclear, however, whether a shift in cash bonus incentive weight from earnings to annual returns is sufficient to elicit the desired reallocation of effort toward long-term value creation. As Core et al. (2003) point out, incentives provided by annual cash pay (including salary and cash bonus) are small (perhaps as little as 10 percent) relative to the incentives provided by the CEO's stock and option portfolio holdings. Further, approximately 50 percent of annual total CEO pay comprises equity incentives (i.e., restricted stock and stock options; Hall and Murphy 2002). Thus, we also examine whether firms use equity-based incentives as an additional lever by which to reallocate CEO effort toward long-term value creation in the presence of high levels of transient ownership.

The optimal level of equity portfolio incentives varies cross-sectionally depending on firm and CEO characteristics. Deviations from optimal portfolio incentive levels may arise due to CEO trading (e.g., the exercise of options), firm characteristic changes (e.g., extensive growth), or CEO characteristic changes (e.g., the aging of a CEO or the hiring of a new CEO; Core and Guay 1999). While firms actively manage grants of new equity incentives through time to correct these deviations and restore optimal equity portfolio levels

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[5] Another way to interpret a finding that firms reduce explicit incentives is that with high levels of transient investors, earnings is less informative and congruent with long-term value, and therefore less useful for contracting. Thus, the board will reduce the contracting weight placed on accounting earnings (Feltham and Xie 1994). Note, however, that our tests control for factors, suggested by prior research, affecting the earnings contracting weight.

[6] An important implication of this prediction is that levels of managerial myopia observed in prior studies (Bushee 1998; Matsumoto 2002) are lower than they would otherwise be had firms not been contracting in a manner that mitigated income-increasing efforts.

(Core and Guay 1999), their ability to do so sometimes meets constraints. In such cases, firms must make trade-offs between the objective of rebalancing the CEO's level of portfolio holdings and other objectives for issuing equity that may arise. For example, a cash shortfall that constrains the amount of cash compensation in a given year creates an incremental demand for equity-based compensation over and above the portfolio rebalancing objective.

We posit that there will also be incremental demand for equity-based incentives if, as suggested above, a shift in cash bonus incentive weight from earnings to annual returns (H1a and H1b) is insufficient to elicit the desired reallocation of effort toward long-term value creation in the presence of transient-induced short-term implicit incentives. We predict that, controlling for portfolio re-balancing, (1) the likelihood of issuing equity grants and (2) the magnitude of equity incentive grants—defined as the change in the dollar value of equity grants for a 1 percent change in stock price—will increase with the level of transient institutional ownership. That is:

> **H2a:** Firms with high transient institutional ownership are more likely to issue equity grants as compared to firms with low transient institutional ownership.
>
> **H2b:** Firms with high transient institutional ownership have larger equity grants as compared to firms with low transient institutional ownership.

Our hypotheses posit that transient investors create implicit incentives for a CEO to make myopic decisions and the CEO contract is designed to mitigate such implicit incentives. A competing hypothesis is that the presence of high levels of transient ownership serves as a proxy for relatively weak shareholder monitoring. Several prior studies have investigated a monitoring hypothesis in different contexts. Chen et al. (2007) find that concentrated, long-term institutional investors positively affect post-merger performance and attribute this improvement to increased monitoring. By contrast, Gaspar et al. (2005) conclude that the lower monitoring from short-term shareholders makes it possible for managers of firms with large short-term investor holdings to make value-reducing acquisitions or to negotiate for myopic reasons.[7] In a contracting context, Hartzell and Starks (2003) document lower compensation levels and increased option pay-for-performance sensitivity associated with higher levels of total institutional ownership. They interpret their findings as evidence of monitoring on the part of institutional investors that reduces agency costs via improved contracting.[8]

Taken together, this prior research suggests an alternative theory for the association between transient ownership and CEO contracts. Because transient institutional investors, like the short-term investors in Gaspar et al. (2005), are unlikely to engage in active monitoring given their relatively small holdings in any one firm and relatively high trading frequency (Bushee 1998), high levels of transient ownership could act as a proxy for a weakened monitoring system. If this is the case, based on prior research (Almazan et al. 2005; Hartzell and Starks 2003) we would expect increased transient ownership to be either unrelated to, or negatively associated with, pay-for-performance sensitivity of equity.[9] This expectation is, however, inconsistent with our predicted increases in the likelihood of issuing equity (H2a) and the magnitude of the equity grant (H2b). Thus, our results will help to distinguish between an implicit incentive and an alternative shareholder monitoring hypothesis for the association between transient ownership and equity pay-for-performance sensitivity.[10]

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[7] Gaspar et al. (2005) also show that acquisition-target firms with short-term shareholders, while more likely to receive acquisition bids, typically receive lower premiums than firms with longer-term investors.

[8] Almazan et al. (2005) further show that the Hartzell and Starks (2003) results are enhanced for firms with more "active" monitors (i.e., investment advisers and investment companies) and attenuated for those with "passive" monitors (i.e., banks and insurance companies and other investment companies such as pension funds).

[9] Hartzell and Starks (2003) and Almazan et al. (2005) do not examine the sensitivity of cash bonus to earnings.

III. RESEARCH SETTING AND DATA DESCRIPTION

Sample

Our initial sample consists of the universe of ExecuComp firms during the years 1992 to 2006. From this database, we collect components of CEO compensation, including bonus, current year option and restricted stock grants, and the CEO's portfolio of option and restricted stock holdings. We also collect data on CEO age and tenure with the firm. From the Center for Research in Security Prices (CRSP), Compustat, and CDA/Spectrum, we collect stock returns, accounting information, and institutional investor holdings (i.e., from SEC Form 13f filings), respectively.

We exclude financial firms because such firms are subject to different legal constraints and may have firm-year observations with missing data. In addition, because mergers, acquisitions, and bankruptcies affect the composition of the investor base and the firm's incentive plan, we drop from the sample all years in which one of these events occurs. Finally, because we analyze the change in compensation for the pay-for-performance tests, firms must have the pertinent information for at least two consecutive years to be retained for analysis. The final sample consists of 10,935 firm-year observations for the cash bonus analysis (H1a and H1b) and 13,872 firm-year observations for the equity analysis (H2a and H2b). Table 1, Panel A describes the reasons for data loss. Panel B classifies the sample by 21 two-digit NAICS industry codes.

Measurement of Transient Ownership

Bushee (1998, 2001) classifies institutional investors according to the average size of the institution's stake in the firm, the degree of portfolio turnover, and the trading sensitivity to current earnings news (i.e., momentum trading). He uses cluster analysis to identify three groups of institutional investors defined as "transient," "dedicated," and "quasi-indexers." Transient institutions are characterized by the highest turnover, the highest use of momentum trading strategies, and relatively high diversification. Dedicated institutions have highly concentrated investments, low turnover, and almost no trading sensitivity to current earnings. The quasi-indexers are highly diversified and typically follow a buy-and-hold strategy.[11]

We use Bushee's (1998) classification methodology to compute transient institutional ownership as a percentage of total shares outstanding (*%TRA*). We combine the categories of dedicated and quasi-indexers into one subsample of "long-term" institutional investors (i.e., *%LT*), which we use as a control.

Institutional investor ownership is measured at the beginning of the fiscal year. Note that, although institutional investors frequently fall out of the transient classification, the total concentration of transient ownership for a given firm is relatively stable through time

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[10] We thank an anonymous reviewer for pointing out this alternative hypothesis.

[11] The classification of transient ownership by Bushee (1998) used in this study is separate and distinct from the passive/active institutional ownership classifications used in Almazan et al. (2005). Importantly, the correlation between the concentration of passive and transient ownership is only 0.11 ($p < 0.01$) in our sample. For more evidence on differences between these classifications, see Bushee (2001).

TABLE 1
Sample Description

Panel A: Sample Construction

	Number of Observations Bonus Analysis	Number of Observations Equity Analysis
Number of ExecuComp observations after deleting (1) financial firms, and (2) firms involved in mergers, acquisitions, and bankruptcies	19,931	19,931
Number of observations with missing ExecuComp data	6,972	3,072
Number of observations with missing Spectrum data	303	268
Number of observations with missing CRSP and Compustat data[a]	1,721	2,719
Total sample size	10,935	13,872

Panel B: Classification by Industry

NAICS	Industry	n	Bonus Analysis Percent	n	Equity Analysis Percent
11	Agriculture, Forestry, Fishing, and Hunting	26	0.24%	36	0.26%
21	Mining	522	4.77%	625	4.51%
22	Utilities	704	6.44%	969	6.99%
23	Construction	138	1.26%	183	1.32%
31	Manufacturing (food and textile)	660	6.04%	825	5.95%
32	Manufacturing (paper, wood, petro, chemical, plastics, glass)	1,628	14.89%	2,059	14.84%
33	Manufacturing (metals, machinery, equipment, furniture)	3,255	29.77%	4,180	30.13%
42	Wholesale trade	402	3.68%	513	3.70%
44–45	Retail trade	817	7.47%	1,025	7.39%
48–49	Transportation and Warehousing	410	3.75%	513	3.70%
51	Information	972	8.89%	1,199	8.64%
52	Finance and Insurance	23	0.21%	33	0.24%
53	Real Estate and Rental and Leasing	46	0.42%	65	0.47%
54	Professional, Scientific, and Technical Services	423	3.87%	529	3.81%
56	Administrative and Support, Waste Management, Remediation	242	2.21%	288	2.08%
61	Educational Services	34	0.31%	44	0.32%
62	Health Care and Social Assistance	220	2.01%	254	1.83%
71	Arts, Entertainment, and Recreation	29	0.27%	43	0.31%
72	Accommodation and Food Services	292	2.67%	366	2.64%
81	Other Services (except Public Administration)	51	0.47%	60	0.43%
99	Other	41	0.36%	63	0.44%
		10,935	100.00%	13,872	100.00%

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[a] We required five consecutive years of price and financial data to compute price and earnings volatility.

as indicated by a correlation of 0.60 (0.90) between *%TRA* and one-year-lag (one-quarter-lag) in *%TRA*. We test the sensitivity of our results to the timing of our institutional investor ownership measurement in the "Sensitivity Tests" subsection below.

Descriptive statistics are presented in Table 2, Panel A (bonus analysis sample, n = 10,935) and Panel B (equity analysis sample, n = 13,872). On average, institutional investors make up 57 percent (56 percent) of the investor base in the bonus (equity) analysis. The mean level of transient and long-term institutional ownership is 18 percent (17 percent) and 39 percent (39 percent), respectively, in the bonus (equity) analysis. Table 2, Panels C and D, present correlations for variables in the bonus and equity analyses, respectively. Variable definitions are in the Appendix.

Self-Selection of Transient Owners

To assess descriptive evidence on the "attraction" of institutional investors toward certain types of firms, we provide mean values of key variables by decile rank of *%TRA* in Table 3. There appear to be some systematic differences across *%TRA* deciles. Firms in the extreme lower and upper deciles of *%TRA* are smaller (*ASSETS*), whereas those in the upper deciles have lower annual returns (*RET*) and have somewhat lower *BTM*. There does not appear to be a pattern of increased earnings (*ROE*) or earnings-relative-to-returns volatility (*REL_NOISE*) across deciles.

Prior research also suggests that the level of transient ownership is positively associated with the percentage of CEO annual compensation that is equity-based (Shin 2008). This finding is consistent with the descriptive evidence in our sample that lower levels of bonus pay as a percent of total pay (as defined in Compustat) exist for firms with higher *%TRA* (correlation of −0.06, $p < .01$). Ownership levels (*OWN*), however, decrease in *%TRA* (correlation of −0.103, $p < .01$). Bonus as a percent of total cash pay (i.e., bonus and salary) increases in *%TRA* (correlation of 0.08, $p < .01$). Thus, there is evidence that firm characteristics—and, to some extent, compensation practices—are associated with the percentage holdings of transient institutional investors.[12] This association may represent an attraction of transient investors to some firms because of firm characteristics and compensation practices. Accordingly, the tests of our hypotheses control for possible self-selection. We do so below using instrumental variables estimation and two-stage least squares (2SLS).

IV. BONUS ANALYSIS—H1A AND H1B

Empirical Model for Test of H1a and H1b

Hypotheses 1a and 1b present hypotheses regarding the sensitivity of CEO compensation to accounting earnings and annual stock returns, respectively. Similar to prior studies (e.g., Lambert and Larcker 1987; Sloan 1993), we measure pay-for-performance sensitivity as the *implicit* incentive weight (i.e., coefficient) in a regression of changes in compensation on these performance measures.

The primary dependent variable used to test H1a and H1b is the change in the natural log of the CEO's annual cash bonus compensation, ΔlnB. Earnings is measured as the change in return-on-equity, ΔROE, where *ROE* is defined as operating income after depreciation divided by average book value of common equity. *RET* is a measure of annual stock returns. We test H1a and H1b using the following empirical model.

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[12] Consistent with Matsumoto (2002), in untabulated results we also find that the number of quarterly consensus analyst earnings forecasts that a firm meets or beats is positively related to the *%TRA* (correlation of 0.21, $p < .01$).

TABLE 2
Descriptive Statistics

Panel A: Variable Distributions—Bonus Analysis (n = 10,935)

	Mean	**Std. Dev.**	**25th**	**Median**	**75th**
%TRA	0.180	0.129	0.079	0.154	0.257
%LT	0.394	0.144	0.295	0.398	0.497
ΔlnB	0.053	2.537	−0.193	0.062	0.469
ΔROE	−0.013	0.244	−0.052	−0.001	0.043
RET	0.085	0.487	−0.211	0.027	0.278
BTM	0.637	0.305	0.433	0.633	0.824
RETIRE	0.100	0.299	0.000	0.000	0.000
lnTENURE	1.740	1.040	1.099	1.792	2.398
REL_NOISE	0.101	0.083	0.047	0.078	0.129
OWN	2.651	6.334	0.101	0.351	1.570
LOSS	0.050	0.219	0.000	0.000	0.000
1994	0.056				
1995	0.075				
1996	0.080				
1997	0.078				
1998	0.073				
1999	0.075				
2000	0.077				
2001	0.081				
2002	0.097				
2003	0.097				
2004	0.097				
2005	0.090				

(continued on next page)

TABLE 2 (continued)

	Mean	Std. Dev.	25th	Median	75th
Instruments					
RATE	4.444	2.553	3.000	5.000	6.000
TIME	25.554	19.656	10.000	20.000	34.000
SP500	0.336	0.472	0.000	0.000	1.000
YIELD	2.401	10.034	0.000	0.173	1.344
BETA	1.061	0.834	0.530	0.918	1.407
LEV	0.235	0.187	0.082	0.230	0.348
SGR	0.943	0.938	0.846	0.925	0.986
lnBVPS	3.106	0.941	2.499	3.121	3.735
REGULATED	0.076	0.266	0.000	0.000	0.000
HITECH	0.121	0.327	0.000	0.000	0.000

Panel B: Variable Distributions—Equity Analysis (n = 13,872 unless otherwise noted)

	Mean	Std. Dev.	25th	Median	75th
%TRA	0.171	0.127	0.072	0.143	0.245
%LT	0.390	0.144	0.289	0.394	0.493
lnPORTFOLIO	11.910	1.944	10.832	11.960	13.100
lnGRANT (n = 9,063)	10.003	1.439	9.103	10.028	10.962
lnMVE	7.311	1.630	6.197	7.191	8.339
lnIRISK	−4.659	0.989	−5.373	−4.687	−3.985
BTM	0.634	0.275	0.434	0.635	0.824
lnTENURE	0.884	3.232	0.693	1.609	2.303
FCF	0.005	0.027	0.000	0.000	0.000
RESIDUAL	0.000	1.466	−0.670	0.036	0.776
lnSALES	7.156	1.644	6.132	7.105	8.211
BTM	0.634	0.275	0.434	0.635	0.824
NOL	0.293	0.455	0.000	0.000	1.000
CF_SHORTFALL	−0.172	0.149	−0.243	−0.168	−0.104

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TABLE 2 (continued)

	Mean	Std. Dev.	25th	Median	75th
DIV_CONSTRAINT	0.478	0.500	0.000	0.000	1.000
RET	0.091	0.499	−0.208	0.028	0.277
1993	0.049				
1994	0.064				
1995	0.071				
1996	0.072				
1997	0.074				
1998	0.076				
1999	0.079				
2000	0.084				
2001	0.085				
2002	0.088				
2003	0.090				
2004	0.087				
2005	0.063				
Instruments					
TRA^2	0.045	0.064	0.005	0.021	0.060
L^2	0.173	0.114	0.083	0.155	0.243
TRA^3	0.015	0.035	0.000	0.003	0.015
LT^3	0.083	0.078	0.024	0.061	0.120

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TABLE 2 (continued)

Panel C: Pearson Correlations—Bonus Analysis[a]

	%TRA	*%LT*	*ΔlnB*	*ΔROE*	*RET*	*BTM*	*RETIRE*	*lnTENURE*	*REL_NOISE*	*OWN*	*LOSS*
%TRA	1.00										
%LT	0.00	1.00									
ΔlnB	**−0.03**	**−0.03**	1.00								
ΔROE	0.01	0.00	0.01	1.00							
RET	**−0.06**	**−0.06**	**0.16**	0.02	1.00						
BTM	**−0.10**	**−0.04**	**−0.05**	−0.02	**−0.16**	1.00					
RETIRE	**−0.03**	**−0.03**	0.01	0.00	−0.01	0.02	1.00				
lnTENURE	−0.01	0.00	0.00	0.01	−0.01	**−0.05**	**0.25**	1.00			
REL_NOISE	−0.02	**−0.10**	−0.01	0.01	0.00	**−0.15**	−0.01	**−0.02**	1.00		
OWN	**−0.10**	**−0.21**	0.00	0.01	**−0.01**	**−0.03**	**0.19**	**0.28**	**0.03**	1.00	
LOSS	−0.01	**−0.21**	**−0.07**	0.00	**−0.03**	**0.05**	**−0.03**	0.00	**0.25**	0.01	1.00

Panel D: Pearson Correlations—Equity Analysis[b]

	lnPORTFOLIO	*lnGRANT*	*%TRA*	*%LT*	*lnMVE*	*lnIRISK*	*BTM*	*lnTENURE*	*FCF*	*lnSALES*	*NOL*	*CF_SHORTFALL*	*DIV_CONSTRAINT*	*RET*
lnPORTFOLIO	1.00													
lnGRANT	**0.44**	1.00												
%TRA	**0.15**	**0.15**	1.00											
%LT	**0.12**	**0.21**	0.01	1.00										
lnMVE	**0.52**	**0.65**	**0.06**	**0.28**	1.00									
lnIRISK	**−0.06**	**−0.12**	**0.29**	**−0.28**	**−0.42**	1.00								
BTM	**−0.38**	**−0.29**	**−0.10**	**−0.04**	**−0.40**	−0.01	1.00							
lnTENURE	**0.24**	−0.01	**0.03**	0.01	**−0.03**	**0.03**	**−0.04**	1.00						
FCF	**−0.12**	**−0.13**	0.00	**−0.04**	**−0.19**	**0.13**	**0.37**	−0.01	1.00					
lnSALES	**0.33**	**0.49**	0.00	**0.32**	**0.77**	**−0.46**	**0.06**	**−0.05**	**−0.05**	1.00				
NOL	0.01	**0.04**	**0.13**	0.02	**−0.03**	**0.18**	−0.02	−0.01	0.02	**−0.07**	1.00			
CF_SHORTFALL	**−0.21**	**−0.11**	**−0.16**	**−0.14**	**−0.18**	**0.06**	**0.25**	**−0.06**	0.02	**−0.11**	**0.07**	1.00		
DIV_CONSTRAINT	−0.01	**−0.04**	**0.24**	**−0.14**	**−0.23**	**0.50**	**−0.07**	**0.04**	**0.04**	**−0.31**	**0.18**	0.01	1.00	
RET	**0.03**	**0.07**	**−0.07**	**−0.06**	**0.06**	**0.09**	**−0.24**	0.01	**−0.11**	**−0.06**	**0.03**	**0.03**	**0.08**	1.00

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[a] Bold values indicate statistical significance at the 0.01 level. The number of observations in each pairwise comparison is 10,935.

[b] Bold values indicate statistical significance at the 0.01 level. The number of observations in each pairwise comparison is 13,872, except for pairwise comparisons with *lnGRANT*, in which case the number of observations is 9,063.

TABLE 3
Means of Key Variables by Decile Ranks of %*TRA*

	Decile of %*TRA*									
	Lowest %*TRA*	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Highest %*TRA***
n	1099	1090	1092	1095	1095	1090	1098	1090	1093	1093
%*TRA*	0.020	0.050	0.078	0.107	0.138	0.172	0.211	0.258	0.319	0.451
%*LT*	0.306	0.383	0.404	0.419	0.425	0.419	0.424	0.418	0.392	0.353
Δ*lnB*	0.338	0.032	0.080	0.054	0.081	−0.042	−0.086	0.011	0.215	−0.156
Δ*ROE*	−0.025	−0.056	−0.019	0.049	0.026	−0.097	−0.049	0.099	0.052	0.007
ROE	0.148	0.149	0.248	0.278	0.263	0.216	0.241	0.293	0.314	0.249
RET	0.189	0.119	0.112	0.134	0.107	0.127	0.077	0.117	0.036	0.005
BTM	0.711	0.674	0.662	0.651	0.644	0.616	0.608	0.605	0.604	0.594
RETIRE	0.123	0.106	0.115	0.095	0.104	0.099	0.090	0.094	0.086	0.084
lnTENURE	1.737	1.679	1.785	1.731	1.807	1.756	1.765	1.723	1.725	1.695
REL_NOISE	0.116	0.103	0.096	0.098	0.096	0.098	0.099	0.100	0.099	0.103
OWN	4.566	3.036	2.915	2.665	2.718	2.600	2.303	2.066	1.995	1.639
LOSS	0.094	0.052	0.043	0.039	0.037	0.049	0.048	0.040	0.040	0.062
ASSETS	3,666.965	5,663.560	7,915.357	9,163.942	5,577.332	8,649.586	5,357.643	4,592.341	3,899.876	2,161.882
Bonus as % of Total Pay	0.197	0.215	0.218	0.218	0.219	0.212	0.200	0.202	0.202	0.172
Bonus as % of Cash Pay	0.280	0.332	0.364	0.381	0.392	0.405	0.394	0.403	0.405	0.368

Variable definitions in the Appendix.

$$\begin{aligned}\Delta lnB_{it} = {} & \beta_0 + \beta_1\Delta ROE_{it} + \beta_2 RET_{it} + \beta_3\%TRA_{it} + \beta_4\Delta ROE_{it} * \%TRA_{it} \\ & + \beta_5 RET_{it} * \%TRA_{it} + \beta_6\%LT_{it} + \beta_7\Delta ROE_{it} * \%LT_{it} + \beta_8 RET_{it} * \%LT_{it} \\ & + \beta_9 BTM_{it} + \beta_{10}\Delta ROE_{it} * BTM_{it} + \beta_{11} RET_{it} * BTM_{it} \\ & + \beta_{12} RETIRE_{it} + \beta_{13}\Delta ROE_{it} * RETIRE_{it} + \beta_{14} RET_{it} * RETIRE_{it} \\ & + \beta_{15} lnTENURE_{it} + \beta_{16}\Delta ROE_{it} * lnTENURE_{it} + \beta_{17} RET_{it} * lnTENURE_{it} \\ & + \beta_{18} REL\_NOISE_{it} + \beta_{19}\Delta ROE_{it} * REL\_NOISE_{it} \\ & + \beta_{20} RET_{it} * REL\_NOISE_{it} + \beta_{21} OWN_{it} + \beta_{22}\Delta ROE_{it} * OWN_{it} \\ & + \beta_{23} RET_{it} * OWN_{it} + \beta_{24} LOSS_{it} + \beta_{25}\Delta ROE_{it} * LOSS_{it} \\ & + \beta_{26} RET_{it} * LOSS_{it} + \langle\text{year indicators}\rangle + \varepsilon_{it} \qquad (1)\end{aligned}$$

where *%TRA* and *%LT* are the percentage of outstanding shares held by transient and long-term institutional investors, respectively, measured as of the *beginning* of the fiscal year (year *t*). We use a changes specification (i.e., $\Delta lnB_{it} = lnB_{i,t} - lnB_{i,t-1}$) to control for unidentified correlated omitted variables. We include as controls interactions between *ΔROE* and *RET* and variables likely to affect pay-for-performance sensitivity of earnings, including (1) firm investment opportunities (*BTM*) (Baber et al. 1996), (2) CEO career horizon as measured by whether the CEO is nearing retirement (*RETIRE*) (Gibbons and Murphy 1992), (3) the log of tenure (*lnTENURE*) (Cheng 2004; Gibbons and Murphy 1992), (4) earnings volatility relative to stock price volatility (*REL_NOISE*) (Banker and Datar 1989; Lambert and Larcker 1987), (5) the percentage of shares held by the CEO (*OWN*) (Lambert and Larcker 1987), and (6) whether the firm has negative earnings (*LOSS*) (Gaver and Gaver 1998; Matsunaga and Park 2001).[13]

The estimation uses pooled data and adjusts for inflated t-statistics by using Froot's (1989) robust standard errors with firm-level clustering to compute p-values. Importantly, we allow for the possibility that *%TRA* and *%LT* are endogenous to the contracting choices firms make using a 2SLS approach (described in the "Instrumental Variables Estimation" subsection). Although we test hypotheses H1a and H1b with both an ordinary least squares (OLS) and 2SLS as recommended by Larcker and Rusticus (2007), we tabulate only the 2SLS results.

Instrumental Variables Estimation

We acknowledge that *%TRA* and *%LT* are likely to be endogenous—that is, as described earlier in our hypothesis development and consistent with descriptive statistics reported in Table 3, investors may be attracted to firms with certain contracting methods or to other firm characteristics correlated with those contracting choices. Consequently, an OLS estimation of the relation between compensation and both *%TRA* and *%LT*, respectively, will yield inconsistent coefficient estimates (Wooldridge 2002). Accordingly, we use a 2SLS methodology to help control for endogeneity in tests of H1a and H1b.

In this section, we describe the instrumental variables (IV) estimations of *%TRA* and *%LT*, including the process by which we identify suitable instruments. To be valid instruments, chosen variables must sufficiently explain *%TRA* and *%LT* and be uncorrelated with the error term in Equation (1) (i.e., with innovations in the change in compensation not explained by the independent variables). We describe tests for these requirements below.

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[13] In particular, the inclusion of *RETIRE* and *OWN* provides controls for factors other than transient ownership that may influence CEO horizon.

We identify an initial set of potential instrumental variables based on the findings of Bushee (2001), who models determinants of transient and long-term ownership. Our objective is to select from his set of determinants those variables for which no theory exists to support a relation with the change in cash bonus—that is, variables that are exogenous to our bonus model. Accordingly, we contend that while theoretical justification exists for the following predictors of the level of institutional ownership, no prior research has theoretically linked any of the following variables to a change in bonus compensation.

Based on the findings of Bushee (2001), we include the following variables as instruments. We first include the S&P common stock rating (*RATE*) and the time listed on the CRSP tape (*TIME*, in years) to proxy for the quality of an investment in the firm. Similarly, we include an indicator for whether the firm is listed on the S&P 500 (*SP500*) because institutional investors often index a portion of their holdings. Because long-term and transient institutional investors have differing preferences for dividend payouts and for firm risk, we include dividend yield (*YIELD*) and the firm's market-model beta (*BETA*). We also include a measure of leverage—i.e., the ratio of debt to equity (*LEV*)—because increased leverage increases investor losses in the event of bankruptcy. Next, we include a measure of prior three-year sales growth (*SGR*) to proxy for institutional investors' preferences for growth firms. Last, we include lagged book value per share (*lnBVPS*) to proxy for institutional investor preferences for firms that have established value in their financial statements.

In addition to variables selected from Bushee (2001), we also include as instrumental variables two-digit NAICS codes to capture investor preferences for specific industries, along with indicator variables that specifically identify high-tech and regulated firms (not perfectly captured by industry classifications). In sum, the first-stage model estimated is as follows:[14]

$$\begin{aligned} <DV>_{it} = {} & \beta_0 + \beta_1 RATE_{it} + \beta_2 TIME_{it} + \beta_3 SP500_{it} + \beta_4 YIELD_{it} + \beta_5 BETA_{it} \\ & + \beta_6 LEV_{it} + \beta_7 SGR_{it} + \beta_8 lnBVPS_{it-1} + \beta_9 REGULATED_{it} \\ & + \beta_{10} HITECH_{it} + \text{<two-digit NAICS indicators>} \\ & + \text{<exogenous>} + \varepsilon_{it} \qquad (2) \end{aligned}$$

where <*DV*> is either *%TRA* or *%LT* and <exogenous> includes all exogenous variables in Equation (1), as recommended (Kennedy 1997). The first-stage regression is estimated with OLS using pooled data. To the extent the instrumental variables explain *%TRA* and *%LT* and are uncorrelated with the residuals from the structural model (1), they are suitable as instrumental variables. We test this presumption with an over-identifying restrictions test described below.

The results of the estimation of Equation (2) are presented in Table 4. To assess the degree of endogeneity present, we conduct a Hausman (1978) specification test and find that, in fact, endogeneity is indicated between change in cash bonus compensation (ΔlnB) and *%TRA* and *%LT* (joint F = 7.74, p < .01).

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[14] Our results are robust to fewer instrumental variables. We include, however, all variables from the Bushee (2001) study that we contend are theoretical determinants of the level of institutional ownership but, based on prior research, are not theoretically linked to a change in compensation bonus.

TABLE 4
Instrumental Variables Prediction of Transient Institutional Ownership (*%TRA*) and Long-Term Institutional Ownership (*%LT*)

	Dependent Variable	
Independent Variables	**(1) $\%TRA_t$ [t-statistic]**	**(2) $\%LT_t$ [t-statistic]**
Constant	0.124***	0.347***
	[4.65]	[10.3]
$RATE_t$	−0.007***	0.001
	[−9.90]	[1.20]
$TIME_t$	−0.001***	0.000
	[−5.56]	[−0.94]
$SP500_t$	−0.009***	0.049***
	[−2.31]	[9.16]
$YIELD_t$	−0.001***	−0.001***
	[−3.98]	[−4.14]
$BETA_t$	0.010***	−0.006***
	[4.63]	[−2.18]
LEV_t	−0.040***	−0.024*
	[−3.63]	[−1.68]
SGR	−0.004***	0.000
	[−2.55]	[−0.42]
$lnBVPS_{t-1}$	0.021***	0.040***
	[5.48]	[7.24]
$REGULATED_t$	−0.002	−0.088***
	[−0.13]	[−3.37]
$HITECH_t$	0.018**	−0.001
	[2.91]	[−0.14]
Two-digit NAICS indicators (suppressed)		
2nd stage exogenous variables (suppressed)		
Adj. R^2	47.98%	30.78%
Partial Adj. R^2	9.79%	17.49%
Observations	10,935	10,935
F-statistic	91.94***	55.25***

***, **, * Represent significance levels at the 1 percent, 5 percent, and 10 percent levels (two-tailed), respectively.

Pooled OLS estimation with Froot's (1989) robust standard errors (clustered by firm) used to compute t-statistics in brackets.

Variable definitions are in the Appendix.

We next assess the relevance and exogeneity of our chosen IVs. First, the adjusted-R^2 of the full *%TRA* (*%LT*) model (including all exogenous variables) is 47.98 percent (30.78 percent). The *partial* adjusted-R^2 (including only the IVs) is more relevant to determining the efficacy of our IV estimation. The *%TRA* model has a partial adjusted-R^2 of 9.79 percent and the *%LT* model has a partial adjusted-R^2 of 17.49 percent. Moreover, a joint test of the instruments is highly significant in both models ($F = 91.94$ for the *%TRA* model and $F = 55.25$ for the *%LT* model, both $p < .0001$). Taken together, the chosen variables appear to be relevant instruments for estimating *%TRA*.

We also conduct an over-identifying restrictions test (Larcker and Rusticus 2007) to ensure that the chosen IVs are sufficiently exogenous to the dependent variables used in the second stage. This test fails to reject the null of exogenous instruments ($\chi^2 = 22.91$, $p = .82$) and supports our claim that the IVs are sufficiently exogenous in the second stage. In sum, our first-stage IV estimation suggests that 2SLS is an improvement over OLS in the estimation of Equation (1).

Note that Equation (1) includes interaction terms between the endogenous variables, *%TRA* and *%LT*, and variables assumed to be exogenous (e.g., *RET* and *ΔROE*). We follow the procedure recommended by Wooldridge (2003) for conducting 2SLS with interactions between endogenous and exogenous regressors.[15] This involves (1) computing predicted values from an initial regression of the endogenous variables on the selected instruments and all exogenous variables (described above), (2) computing the needed interactions between the instrumented endogenous variables and exogenous regressors, and (3) estimating via 2SLS the full model with the interactions included as additional instruments. In the next subsection, we present the results of the 2SLS estimations of Equation (1) used to test H1a and H1b.

Tests of H1a and H1b

The estimation of Equation (1) presented in Table 5 provides the tests of H1a and H1b. The coefficient on the *ΔROE * %TRA* interaction term is negative (-3.891, $p < .05$). Thus, consistent with H1a, the sensitivity of cash bonus compensation to accounting earnings decreases as the ownership levels of transient institutional investors increase. Consistent with H1b, the coefficient on the *RET * %TRA* interaction term is positive (1.741, $p < .05$), indicating higher bonus sensitivity to annual returns for firms with larger transient ownership. Taken together, these results suggest that firms, on average, design cash bonus contracts in a manner that mitigates the short-term implicit incentives created by the presence of transient investors.

Importantly, Table 5 shows that our results are robust to the inclusion of control variables previously found to affect pay-for-performance sensitivity, including investment opportunities (*BTM*), CEO nearing retirement (*RETIRE*), CEO tenure (*lnTENURE*), earnings relative to stock price volatility (*REL_NOISE*), the percent of shares held by the CEO (*OWN*), and negative earnings (*LOSS*). That is, our results hold with the addition of terms interacting *ΔROE* and *RET* with these variables.

In summary, the results presented in Table 5 suggest that cash bonus pay is less sensitive to earnings (i.e., *ΔROE*) and more sensitive to annual stock returns in firms with higher levels of transient ownership. As an example (based on results presented in Table 5 and assuming all other variables at their median values), these results indicate that a firm with transient ownership of 26 percent (3rd quartile) has a contracting weight on earnings (returns) that is 11 percent lower (19 percent higher) than the contracting weight for an otherwise comparable firm with transient ownership of 8 percent (1st quartile).

Sensitivity Tests

A number of (untabulated) sensitivity tests establish that the results reported in Table 5 are robust to alternative model specifications and variable measurements.

First, we investigate the sensitivity of the results to the measurement timing of *%TRA*. Note that the correlation between *%TRA* and one-quarter-lag *%TRA* is 0.90, while the

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[15] Results are similar using the Heckman and Vytlacil (1998) 2SLS estimators.

TABLE 5
The Association between Transient Institutional Ownership (*%TRA*) and the Sensitivity of CEO Cash Bonus Compensation to Earnings (H1a) and Annual Returns (H1b)

		Dependent Variable: ΔlnB_t	
Independent Variables	**Predicted Sign**	**Coefficient**	**Robust z-statistic**
Constant		0.027	0.14
ΔROE_t		0.165	0.18
RET_t		−0.221	−0.64
$\%TRA_t$		0.806*	1.85
$\Delta ROE_t * \%TRA_t$	H1a (−)	−3.891**	−2.19
$RET_t * \%TRA_t$	H1b (+)	1.741**	2.10
$\%LT_t$		−0.292	−0.99
$\Delta ROE_t * \%LT_t$		1.402	0.86
$RET_t * \%LT_t$		1.487**	2.20
BTM_t		0.157**	1.99
$\Delta ROE_t * BTM_t$		2.158***	3.51
$RET_t * BTM_t$		1.129***	5.45
$RETIRE_t$		0.117**	2.08
$\Delta ROE_t * RETIRE_t$		0.901	1.40
$RET_t * RETIRE_t$		−0.336*	−1.69
$lnTENURE_t$		0.006	0.33
$\Delta ROE_t * lnTENURE_t$		0.288**	2.31
$RET_t * lnTENURE_t$	.	0.021	0.37
REL_NOISE_t		0.408*	1.88
$\Delta ROE_t * REL\_NOISE_t$		−1.124	−1.40
$RET_t * REL\_NOISE_t$		0.395	0.63
OWN_t		0.000	0.00
$\Delta ROE_t * OWN_t$		−0.016	−0.53
$RET_t * OWN_t$		0.006	0.47
$LOSS_t$		−0.403***	−3.03
$\Delta ROE_t * LOSS_t$		−0.853**	−2.28
$RET_t * LOSS_t$		−0.344*	−1.79
Year indicators (suppressed)			
Observations		10,935	
Adj. R^2		10.44%[a]	
First stage Adj. R^2:			
$\%TRA$		47.87%	
$\%LT$		30.44%	
$\Delta ROE * \%TRA$		80.26%	
$RET_t * \%TRA$		77.72%	
$\Delta ROE * \%LT$		88.44%	
$RET * \%LT$		87.31%	
χ^2-statistic		823.73***	

***, **, * Represent significance levels at the 1 percent, 5 percent, and 10 percent levels (one-tailed for predicted signs, two-tailed otherwise), respectively.

Pooled 2SLS estimation with Froot's (1989) robust standard errors (clustered by firm) used to compute z-statistics.

[a] From an equivalent OLS estimation.

Variable definitions are in the Appendix.

correlation between *%TRA* and one-year-lag *%TRA* is 0.60. Thus, although *%TRA* is relatively "sticky," there is some variation through time. The effects of *%TRA* on cash bonus sensitivity to earnings and annual returns (i.e., the negative *%TRA*-Δ*ROE* and positive *%TRA-RET* interactions) documented in Table 5 are robust to the measurement of transient ownership at the end of the quarter two quarters prior to the start of the fiscal year, as opposed to at the end of the quarter immediately preceding the start of the fiscal year, as currently measured. As the measurement of *%TRA* moves forward within the current fiscal year (i.e., from quarter two to quarter four of the current fiscal year), the earnings and returns sensitivity results weaken and, in fact, are insignificant when *%TRA* is measured as of the end of the third and fourth quarters of the current fiscal year. Thus, firms appear to make adjustments to bonus sensitivity to accounting earnings and annual stock returns based on the transient ownership as of the beginning of the year—and even prior to the fiscal year start. This is coincident with the setting of annual performance and bonus targets as documented by Indjejikian and Nanda (2002).

Second, to further control for outliers in the primary independent variables of interest, Δ*ROE* * *%TRA* and *RET* * *%TRA*, we also estimate the model in Table 5 using decile ranks of *%TRA*. Inferences are identical when *%TRA* is replaced with its decile rank. Third, the results are robust to the inclusion of variables controlling for the effect on pay-for-performance sensitivity of firm size (Schaefer 1998). Adding controls for size (measured as *lnMVE* or $MVE^{1/2}$), and size interacted with each of Δ*ROE* and *RET*, yields the same qualitative results for the Δ*ROE* * *%TRA* and *RET* * *%TRA* interactions as reported in Table 5. Note also that, consistent with Schaefer (1998) the sensitivity of cash bonus to annual returns is decreasing in firm size.

Finally, the results are robust to the inclusion of variables controlling for the effect on earnings pay-for-performance sensitivity of shareholder monitoring. Replacing *%LT* with the proportion of institutional ownership help by the top five institutional investors, Top 5 (i.e., as measured by Hartzell and Starks [2003]; converted to decile ranks), yields the same qualitative results for the Δ*ROE* * *%TRA* and *RET* * *%TRA* interactions (measured in deciles) as reported in Table 5. In addition, we test whether the cash bonus contracting adjustments documented in Table 5 (H1a and H1b) are stronger for firms with higher levels of Top 5 institutional ownership concentration. We find evidence that increased concentration of Top 5 institutional ownership is associated with greater adjustments to cash bonus sensitivity to both earnings (i.e., larger reduction in sensitivity, H1a) and returns (i.e., larger increase in sensitivity, H1b), as a means to mitigate transient-induced short-term implicit incentives.

EQUITY ANALYSIS—H2A AND H2B

Hypothesis 2a predicts that firms with high levels of transient ownership will be more likely to issue equity grants, and H2b predicts that the magnitude of annual equity grants will be greater for firms with larger transient ownership. We test these hypotheses, while controlling for any rebalancing of equity portfolios, by following the procedures outlined in Core and Guay (1999). Specifically, we first model the optimal equity portfolio holdings for our sample of firms using the same five determinants examined by Core and Guay (1999). From this model, we compute an incentive residual for each firm-year. We next include the lag of this residual—along with *%TRA*, *%LT*, and other controls—to estimate the associations between transient ownership and annual equity grant decisions (i.e., whether to grant equity, H2a, and/or the size of the equity grant, H2b).

Optimal Portfolio Model

We model the optimal equity portfolio holdings and compute the annual deviation from the optimal holdings for each firm-year for use as a control in tests of H2a and H2b. Following Core and Guay (1999), we estimate the following model of optimal equity portfolio holdings:

$$\begin{aligned} lnPORTFOLIO_{i,t-1} = {} & \beta_0 + \beta_1 lnMVE_{i,t-1} + \beta_2 lnIRISK_{i,t-1} \\ & + \beta_3 BTM_{i,t-1} + \beta_4 lnTENURE_{i,t-1} + \beta_5 FCF_{i,t-1} \\ & + \text{<two-digit NAICS indicators>} \\ & + \text{<year indicators>} + \varepsilon_{i,t-1} \end{aligned} \tag{3}$$

where *lnPORTFOLIO* is the incentive value of the CEO's portfolio equity holdings measured as the sensitivity of the total value of stock and options held by the CEO to a 1 percent change in stock price. Incentives from the portfolio of stock are measured as the value of the CEO's stock holdings at year-end multiplied by 1 percent. The incentives provided by the portfolio of options are computed using the one-year approximation method detailed in Core and Guay (2002). This method uses estimates of average exercise price and average time-to-maturity, relying on information from the most recent proxy statement.

Five determinants of the optimal equity portfolio incentives are identified based on findings of Core and Guay (1999). These include four variables expected to be positively associated with optimal equity portfolio incentives: (1) firm size as measured by the log of the market value of equity (*lnMVE*); (2) idiosyncratic risk as measured by the log of the standard deviation of the residual from a market model regression estimated over 36 months of returns, ending with the fiscal year-end (*lnIRISK*); (3) the log of the CEO's tenure with the firm in years (*lnTENURE*); and (4) a measure of free cash flow (*FCF*). In addition, book-to-market (*BTM*) is expected to be negatively associated with the level of equity portfolio incentives.

The results of the estimation of Equation (3) presented in Table 6 are consistent with those of Core and Guay (1999). Specifically, the optimal level of portfolio equity incentives is positively related to firm size (*lnMVE*), idiosyncratic risk (*lnIRISK*), and CEO tenure (*lnTENURE*) and negatively related to book-to-market (*BTM*). Like Core and Guay (1999), we fail to find a statistically significant association between optimal portfolio incentives and free cash flow (*FCF*). The adjusted-R^2 of our model is 42.94 percent, as compared to 47.8 percent in Core and Guay (1999). The residual from Equation (3), computed as the difference between the observed and predicted values of *lnPORTFOLIO*, is a measure of the deviation from the optimal equity portfolio at each year-end (*RESIDUAL*). This variable is used in the tests of H2a and H2b to control for the firm's rebalancing objective when making annual equity grant decisions.

Equity Grant Models—Tests of H2a and H2b

Empirical Models for Tests of H2a and H2b

Hypotheses 2a and 2b predict that the incentives from annual equity grants—that is, both the likelihood of granting equity and the size of the grant—will be positively associated with the level of transient institutional ownership. The dependent variable used for the test of H2a, *CHOICE*, is an indicator variable equal to 1 if the firm grants equity, and 0 otherwise. The dependent variable used for the test of H2b, *lnGRANT*, is the natural log

TABLE 6

Determinants of the Logarithm of Portfolio Equity Incentives (*lnPORTFOLIO*)

Independent Variables	Predicted Sign	Dependent Variable $lnPORTFOLIO_{t-1}$ [t-statistic]
$Constant_{t-1}$		8.109*** [8.76]
$lnMVE_{t-1}$	+	0.580*** [24.78]
$lnIRISK_{t-1}$	+	0.098*** [2.83]
BTM_{t-1}	−	−1.092*** [−8.91]
$lnTENURE_{t-1}$	+	0.142*** [22.5]
FCF_{t-1}	+	0.679 [1.11]
Two-digit NAICS indicators (suppressed)		
Year indicators (suppressed)		
Observations		13,872
Adj. R^2		42.94%
F-statistic		66.48***

***, **, * Represent significance levels at the 1 percent, 5 percent, and 10 percent levels (one-tailed for predicted signs, two-tailed otherwise), respectively.

Pooled OLS estimation with Froot's (1989) robust standard errors (clustered by firm) used to compute t-statistics.

Variable definitions are in the Appendix.

of the sum of the stock and option grant sensitivities to a 1 percent change in stock price.[16] As before, the incentive from the grant of restricted stock is the value of the CEO's stock grant multiplied by 1 percent. To measure the incentives from the stock option portion of the annual equity grants, we compute the sensitivity of the annual option grant to a 1 percent change in price (Core and Guay 2002, Appendix A):

$$\partial(\text{option value})/\partial(S) * (S/100) = e^{-dT}\Phi(Z)*(S/100)$$

where:

$Z = [ln(S/X) + T(r - d + \sigma^2/2)]/\sigma T^{(1/2)}$;
S = grant date stock price (available from ExecuComp);
X = exercise price of the option (available from ExecuComp);
Φ = cumulative normal probability function;

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[16] Core and Guay (1999) add 1 to equity incentives before taking the log to avoid loss of data. However, log(*GRANT* + 1) cannot be negative and, thus, violates the normality assumption. While in practice this is not a significant violation (especially since the nonzero equity grant values are far from zero), in the strictest sense the addition of 1 violates the model.

σ = expected stock return volatility measured as the standard deviation of daily stock returns over the last 120 trading days of the fiscal year;
r = ln(risk free rate) where risk-free rate is the yield of a treasury bond with a maturity corresponding to the time to expiration of the option;
d = ln(expected dividend yield) where expected dividend yield is estimated as cash dividends paid divided by year-end stock price; and
T = time to maturity in years (available from ExecuComp).

Core and Guay (1999) empirically show that firms actively manage portfolio grants toward the optimal equity portfolio. Because transient investors actively engage in earnings-based trading, transient ownership may be correlated with the extent to which the CEO's portfolio is out of balance (i.e., as modeled in Equation (3)). We thus control for any rebalancing efforts the firm makes by including the lag of *RESIDUAL*, the residual from the optimal portfolio equity incentive model estimated in Table 6, in our equity grant model. Consistent with Core and Guay (1999), we expect the coefficient on this variable to be negative. We also control for the level of long-term institutional ownership, *%LT*, and seven determinants of annual equity incentives documented in Core and Guay (1999) that capture demand for equity incentives incremental to rebalancing needs. These include: lagged log of sales (*lnSALES*), lagged book-to-market (*BTM*), lagged net operating loss carryforwards (*NOL*), lagged cash flow shortfall (*CF_SHORTFALL*), lagged dividend constraints (*DIV_CONSTRAINT*), and both the contemporaneous and lagged annual stock return (*RET*). For our tests of H2a and H2b we estimate models (4) and (5) respectively:

$$\begin{aligned} Pr(CHOICE_{i,t} = 1) = {} & \beta_0 + \beta_1 \%TRA_{i,t} + \beta_2 \%LT_{i,t} + \beta_3 RESIDUAL_{i,t-1} \\ & + \beta_4 lnSALES_{i,t-1} + \beta_5 BTM_{it-1} + \beta_6 NOL_{it-1} \\ & + \beta_7 CF\_SHORTFALL_{it-1} + \beta_8 DIV\_CONSTRAINT_{it-1} \\ & + \beta_9 RET_{i,t} + \beta_{10} RET_{i,t-1} + \beta_{11} TRA\ RESIDUAL_{i,t-1} \\ & + \beta_{12} LT\ RESIDUAL_{i,t-1} + \text{<two-digit NAICS indicators>} \\ & + \text{<year indicators>} + \varepsilon_{i,t-1} \end{aligned} \tag{4}$$

$$\begin{aligned} lnGRANT_{i,t} = {} & \beta_0 + \beta_1 \%TRA_{i,t} + \beta_2 \%LT_{i,t} + \beta_3 RESIDUAL_{i,t-1} \\ & + \beta_4 lnSALES_{i,t-1} + \beta_5 BTM_{it-1} + \beta_6 NOL_{it-1} \\ & + \beta_7 CF\_SHORTFALL_{it-1} + \beta_8 IV\_CONSTRAINT_{it-1} \\ & + \beta_9 RET_{i,t} + \beta_{10} RET_{i,t-1} + \beta_{11} TRA\ RESIDUAL_{i,t-1} \\ & + \beta_{12} LT\ RESIDUAL_{i,t-1} + \text{<two-digit NAICS indicators>} \\ & + \text{<year indicators>} + \varepsilon_{i,t-1} \end{aligned} \tag{5}$$

where *%TRA* is the level of transient institutional ownership. Hypothesis 2a predicts that the coefficient on *%TRA* in Equation (4) is positive; H2b predicts the coefficient on *%TRA* in Equation (5) is positive.

Although a Tobit (Tobin 1958) estimation procedure could be used in this setting as a means of modeling the censored equity grant data (indeed, Core and Guay [1999] begin with a Tobit estimation), we instead estimate Equations (4) and (5) separately as a "hurdle" model—i.e., the so-called "two-part" model (Cragg 1971)—as described in Wooldridge (2002).[17] This approach consists of the estimation of Equation (4) with a probit model followed by the estimation of Equation (5) with a truncated normal regression model.[18]

We use the two-part hurdle model for two reasons. First, we are interested in separately estimating the associations between transient ownership and the choice of whether to issue an equity grant (β_1 in Equation (4)), and between transient ownership and the decision regarding the size of the equity grant (β_1 in Equation (5)). The hurdle model allows for these separate estimates. Second, a Tobit model presumes that the effect of the independent variables on the likelihood of making an equity grant and on the size of the equity grant are of the same sign and of the same relative magnitude (i.e., relative to the effects of the other independent variables); the hurdle model makes no such restriction (Wooldridge 2002). Because there is no theory to predict that the effect of transient ownership on the choice of issuing equity and the size of the equity grant will be of equal magnitudes, we use the hurdle model to provide for a more general test of H2a and H2b. Indeed, a Tobit restriction test indicates that the Tobit model is a significant restriction as compared to the Cragg (1971) two-part hurdle model ($\chi^2 = 24{,}054$, $p < .001$).

As in the estimation of the bonus model (Equation (2)), *%TRA* and *%LT* are endogenous to both the decision of whether to pay equity (Equation (4)) and the decision regarding the magnitude of the annual equity grant (Equation (4)). Specifically, tests reject the null of no endogeneity for both models ($\chi^2 = 19.85$, $p < .01$ for Equation (4); $\chi^2 = 31.82$, $p < .01$ for Equation (5)). In order to generate consistent estimates of our model parameters, we include two variables that are the *residuals* from instrumental variables estimations of *%TRA* and *%LT* (*TRA RESIDUAL* and *LT RESIDUAL* in Equations (4) and (5) above) in each of the two parts of the hurdle model (Rivers and Vuong 1988; Smith and Blundell 1986). This procedure is described in Wooldridge (2002, 531).

As in the endogenous bonus model (Equation (2)), we identify instruments for *%TRA* and *%LT* (1) that adequately explain these variables, and (2) for which there is no *ex ante* theory suggesting these variables will be determinants of the *CHOICE* or *lnGRANT* dependent variables. Although the variables used as *%TRA* and *%LT* instruments for the endogenous bonus model, e.g., *RATE, TIME*, and *LEV*, were in theory and in practice (i.e., verified with an over-identifying restrictions test) exogenous to the ΔlnB dependent variable, these variables are likely to be endogenous to the equity grant decision. Hence, they are *not* suitable as instruments in the two parts of the hurdle model. It is therefore necessary to identify different instruments. We use as instruments for both the estimation of the *CHOICE* model (Equation (4)) and of the truncated normal regression model (Equation (5)) the lagged values of $\%TRA^2$, $\%TRA^3$, $\%LT^2$, and $\%LT^3$. These variables were chosen because they are correlated with the endogenous variables being instrumented, but not (contemporaneously) correlated with the disturbance term in the equity choice and equity grant models (Kennedy 1997). Also included in the (untabulated) instrumental variables estimations of *%TRA* and *%LT* are all exogenous variables from Equations (4) and (5).

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[17] By contrast, Shin (2008) uses a Tobit model to estimate the influence of institutional investment horizon on the pay-for-performance sensitivity of new stock option grants.

[18] An alternative approach is to use a Heckman selection model. However, in the strictest sense, the Heckman selection model is not appropriate in this situation because there is no "counterfactual." That is, it is not meaningful to ask: "What size of equity grant would a firm make if it did not make an equity grant?" We thank Jeffrey Wooldridge for his advice on this matter, which can best be summed up by his comment that "if it makes sense to estimate a Tobit, then it is not a selection problem to be modeled with a Heckman procedure." Note, however, that our inferences are similar when modeled with a Heckman procedure.

The four instrumental variables adequately explain %*TRA* and %*LT* with significant joint F-tests ($p < .001$ for both) and partial adjusted-R^2s of 35.9 percent and 59.7 percent, respectively (untabulated). In addition, they are, in theory and in practice (i.e., verified with an over-identifying restrictions test, $\chi^2 = 0.293$, $p > .86$), exogenous to the *lnGRANT* model.

Tests of H2a and H2b

Table 7 presents the results of our analysis of the association between transient ownership and equity incentives. Bootstrapped standard errors are used to compute the z-statistics and p-values. Model (1) presents the results of the probit equity grant choice model; Model (2) presents the results of the equity grant structural model. For each, we present both the estimated coefficients (first column) and the average partial effects (second column).

Consistent with Core and Guay (1999), Model (1) results show that *RESIDUAL* is negatively associated with *CHOICE* (coefficient of −0.110, $p < .01$), suggesting that firms are more likely to award equity grants when the CEO's portfolio of equity incentives has deviated from the optimal level; specifically, firms are more likely to grant equity when portfolio equity incentives are below the optimal level, and less likely when they exceed the optimal level. Model (1) further shows that, incremental to the portfolio-rebalancing objective, %*TRA* and %*LT* are positively associated with *CHOICE*. The coefficient on %*TRA* is 1.329 ($p < 0.01$), and the coefficient on %*LT* is 1.181 ($p < .01$). Thus, consistent with H2a (and controlling for the effect of %*LT* on the equity grant choice), firms with higher levels of transient ownership are more likely to issue equity incentives. In particular, the estimated partial effects indicate that an additional 1 percent of transient ownership (e.g., 18 percent of shares outstanding as compared to the mean of 17 percent) is associated with an increase of about 0.37 percent in the probability of granting equity. Note, however, the partial effect for %*TRA* is not statistically significantly different from the partial effect of %*LT* ($z = .33$, $p > .10$).

Model (2) presents the results of the estimation of a truncated normal regression model of the equity grant. In their estimation of the *lnGRANT* model, Core and Guay (1999) find no statistically significant association between *RESIDUAL* and *lnGRANT*. They conclude that "the incentive residual appears to influence the expected magnitude of equity grants through the probability of a new grant, but not through an association with the grant size" (Core and Guay 1999, 173). By contrast, we find a statistically significant negative association between the incentive residual, *RESIDUAL*, and the magnitude of equity grants. The partial effect for the *RESIDUAL* variable is −0.253 ($p < .01$); a CEO whose portfolio equity incentives are 10 percent below average receives approximately 25.3 percent more equity incentives as compared to a CEO with an optimal level of portfolio equity incentives.

Model (2) also provides evidence consistent with H2b that %*TRA* is positively associated with *lnGRANT* (partial effect of 5.286, $p < .01$). A firm with 1 percent larger transient ownership (e.g., 18 percent of shares outstanding as compared to the mean of 17 percent) grants approximately 5.4 percent ($e^{0.05286} - 1$) more equity incentives. The partial effect of %*LT* is also positive and statistically significant (coefficient of 3.446, $p < .01$) and the difference between the %*TRA* and %*LT* partial effects is statistically significant ($\chi^2 = 1.841$, $p < .05$). With the exception of *DIV_CONSTRAINT* and lagged *RET*, other coefficients are of the expected signs and are statistically significant.

In sum, controlling for portfolio rebalancing incentives and other variables shown by Core and Guay (1999) to provide incremental demand for equity incentives, a higher level

TABLE 7
Determinants of the Annual Grant of Equity Incentives (*lnGRANT*)

		Dependent Variables			
		(1) *CHOICE*$_t$		(2) *lnGRANT*$_t$	
Independent Variables	**Partial Effect Predicted Sign**	**Coefficients [z-statistic]**	**Partial Effects [z-statistic]**	**Coefficients [z-statistic]**	**Partial Effects [z-statistic]**
Constant		0.550 [0.56]		5.626*** [21.40]	
$\%TRA_t$	H2a,b (+)	1.329*** [4.09]	0.368*** [4.15]	2.263*** [8.23]	5.286*** [24.10]
$\%LT_t$	?	1.181*** [6.43]	0.328*** [6.47]	0.338*** [2.21]	3.446*** [29.20]
$RESIDUAL_{t-1}$	−	−0.110*** [−10.50]	−0.031*** [−10.80]	0.061*** [4.69]	−0.253*** [−25.00]
$lnSALES_{t-1}$	+	0.072*** [7.13]	0.020*** [7.16]	0.506*** [36.50]	0.572*** [51.90]
BTM_{t-1}	−	−0.262*** [−4.19]	−0.073*** [−4.22]	−1.705*** [−36.10]	−1.985*** [−53.40]
NOL_{t-1}	+	0.019 [0.56]	0.005 [0.56]	0.079*** [3.39]	0.111*** [5.99]
$CF\_SHORTFALL_{t-1}$	+	0.258*** [2.60]	0.071*** [2.62]	0.619*** [7.67]	1.160*** [18.10]
$DIV\_CONSTRAINT_{t-1}$	+	−0.077 [−2.52]	−0.021 [−2.55]	0.138*** [4.56]	−0.104*** [−4.33]

(*continued on next page*)

TABLE 7 (continued)

Independent Variables	Partial Effect Predicted Sign	Dependent Variables			
		(1) *CHOICE$_t$*		(2) *lnGRANT$_t$*	
		Coefficients [z-statistic]	Partial Effects [z-statistic]	Coefficients [z-statistic]	Partial Effects [z-statistic]
RET$_t$	+	0.183***	0.051***	0.211***	0.652***
		[5.40]	[5.47]	[7.30]	[28.6]
RET$_{t-1}$	+	−0.046	−0.013	0.068***	−0.072***
		[−1.70]	[−1.71]	[2.05]	[−2.73]
TRA RESIDUAL$_t$	?	−0.672*	−0.186*	−1.568***	−5.071***
		[−1.88]	[−1.90]	[−5.34]	[−21.7]
LT RESIDUAL$_t$	?	−0.800***	−0.222***	−0.106	−1.897***
		[−2.94]	[−2.96]	[−0.44]	[−10.10]
Two-digit NAICS indicators (suppressed)					
Year indicators (suppressed)					
Observations		11,833		9,062	
Pseudo-R^2		9.33%			
χ^2-statistic		1,200.92***		5,249.02***	
Wald χ^2 test of endogeneity		19.85***		31.82***	
χ^2 Test *%TRA* = *%LT*		0.148	0.041	1.926***	1.841**
		[0.33]	[0.33]	[4.89]	[5.90]

***, **, * Represent significance levels at the 1 percent, 5 percent, and 10 percent levels (one-tailed for predicted signs, two-tailed otherwise), respectively.

The first column presents results of a probit regression of the likelihood that equity will be paid to the CEO. The second column presents the average partial effects. The third column presents the results of a truncated normal model estimation of the magnitude of the equity grant to the CEO.

Standard errors and z-statistics were estimated with a bootstrapping procedure using 50 reiterations.

Variable definitions are in the Appendix.

of transient ownership is associated with a higher probability of making equity grants and with a larger magnitude of equity grant incentives.

Alternative Explanations

An important assumption of our study is that the firm designs contracts to mitigate short-term implicit incentives of transient investors, even if transient investors dominate the investor base. Here we consider the possibility that when transient ownership is high *relative* to long-term institutional ownership, firms will be less likely to use contracting to mitigate transient implicit incentives. In untabulated results, we repeat the Table 7 analysis while substituting a measure of transient ownership relative to long-term ownership (i.e., *%TRA/ %LT*) in lieu of the individual variables (*%TRA* and *%LT*). We find that this relative measure of transient ownership is positively associated with the size of the equity grant (but not with the likelihood of granting equity). This suggests that, consistent with H2b, contracts are used to mitigate short-term influences of transient investors, even in the presence of dominant transient ownership.

An alternative explanation for the results reported in Table 7 is that while transient owners do not play an active monitoring role, their trading behavior serves as a disciplining mechanism on the actions of the firm. That is, the observed positive association between transient ownership and equity incentives is actually a result of the firm responding to transient investors' preferences as communicated via their trading behavior. Indeed, Parrino et al. (2003) show that institutional investors (as a whole, not limited to transient investors) "vote with their feet" to force CEO turnovers. It is less clear, however, whether institutional trading behavior disciplines governance choices, in general, and CEO contracting in particular.

We test this conjecture by estimating a "reverse regression" in the spirit of Hartzell and Starks (2003). Specifically, if the results documented in Table 7 are driven by "transient investors voting with their feet" then we would observe not only an association between change in transient ownership and subsequent changes in equity incentives (i.e., equity incentives adjusted in response to transient selling), but also an association between change in equity incentives and subsequent changes in transient ownership (i.e., transient buying and selling in response to changes in equity incentives). In untabulated results we find a positive association between changes in transient ownership and subsequent changes in equity grant incentives. However, we find no statistically significant associations between changes in equity grant incentives and subsequent changes in transient ownership. This finding is consistent with Bushee et al. (2009) who find that only 10 percent of institutional investors are governance sensitive (i.e., alter their holding based on governance characteristics). We conclude that it is unlikely that transient trading behavior provides a governance disciplining mechanism; rather, the results support our contention that the firm contracts in a manner that mitigates transient induced short-term implicit incentives.

Sensitivity Tests

We conduct a number of (untabulated) sensitivity tests to ensure that the primary results reported in Table 7 are robust to alternative model specifications and variable measurements.

First, we investigate the sensitivity of the results to the measurement timing of *%TRA*. As in the cash bonus analysis, the primary results reported in Table 7 use *%TRA* and *%LT* measured at the end of the quarter immediately preceding the start of the fiscal year. The effects of *%TRA* on the likelihood of granting equity (Table 7, Model (1)) and on the size of the equity grant (Table 7, Model (2)) are insensitive to the timing of the *%TRA* measurement; that is, the positive association of *%TRA* on *CHOICE* and *lnGRANT* are positive and significant even when *%TRA* is measured as of the end of the fiscal year.

Second, to control further for outliers in the primary independent variables of interest, *%TRA*, we also estimate the model in Table 7 using decile ranks of *%TRA*; inferences are identical. Third, the results are robust to the inclusion of variables controlling for the effect on pay-for-performance sensitivity of firm size (Schaefer 1998). Adding additional controls for size (measured as *lnMVE* or $MVE^{1/2}$) yields the same qualitative results for *%TRA* interactions as reported in Table 7.

Fourth, the results are robust to the inclusion of the Top 5 concentration variable, a proxy for shareholder monitoring. Replacing *%LT* with the proportion of institutional ownership held by the Top 5 institutional investors yields the same qualitative results for *%TRA* (measured in deciles) as reported in Table 7. In addition, we test whether the significant increases in the likelihood of granting equity (H2a) and equity grant size (H2b) associated with *%TRA* documented in Table 7 are stronger for firms with higher levels of Top 5 institutional ownership. We find that the partial effect of *%TRA* in the equity grant (*CHOICE*) model is positive and statistically significant (partial effect of 0.321, $p < .01$) for the subsample of firms with above median Top 5 institutional ownership concentration. However, this partial effect does not differ significantly ($p > .10$) from the partial effect for the subsample of firms with below median Top 5 concentration (partial effect of 0.289, $p < .01$). For the equity grant size (*lnGRANT*) model, the partial effect of *%TRA* is positive and statistically significant for the subsample of above-median Top 5 concentration (partial effect of 4.668, $p < .01$). Moreover, this partial effect is significantly larger ($\chi^2 = 0.321$, $p < .05$) than the partial effect of *%TRA* for the subsample of below-median Top 5 concentration firms (partial effect of 4.348, $p < .01$). We interpret this as evidence that increased concentration of Top 5 institutional ownership is associated with larger equity grants *when* grants are given, but the likelihood *itself* of granting equity does not increase.

Fifth, we include *%TRA* and *%LT* as determinants of the optimal portfolio model to see if the corresponding changes in the residual from the regression affect the choice to grant equity and the decision about the size of the equity grant, conditional on equity being granted. We find that *%TRA* has a statistically insignificant coefficient when included in the model reported in Table 6. Moreover, there is no change to the inferences in the regressions in Table 7; both the probability of an equity issue and the magnitude of the issue are increasing in *%TRA*.

Finally, following Core and Guay (1999) we also conduct a Tobit estimation of the determinants of the annual grant of equity incentives. By doing so, we restrict the signs and relative magnitudes of the coefficients on the explanatory variables in the selection model (Model (1) of Table 7) so that they equal those in the structural model (Model (2) of Table 7). Consistent with the results from the Cragg (1971) two-part hurdle model reported in Table 7, the coefficient on *%TRA* in the Tobit model is positive and statistically significant (coefficient of 6.262, $p < .01$). Note, however, that as stated above the Tobit model is a significant restriction as compared to the two-part hurdle model estimated in Table 7.

VI. CONCLUSION

Prior research suggests that institutional investors act, on average, as monitors of a firm's actions. That is, because of increased incentives to monitor management (i.e., large shareholdings) and the ability to affect change (i.e., large voting blocks), these investors play an important role in corporate governance. Although prior empirical studies document associations of institutional investors as a whole to the structure of compensation contracts, few studies explicitly consider differences in institutional investors. Yet, short-term (i.e., transient) institutional investors can engage in trading behaviors that create implicit incentives for CEOs to take actions resulting in improvements in the reported short-term performance of the firm (e.g., earnings), at the expense of long-term value creation.

It is unclear from extant research if these implicit incentives affect the design of CEO compensation contracts. Specifically, it is unclear whether firms adjust explicit incentive contracts to mitigate the implicit incentives created by transient institutional investors. If the implicit incentives are sufficiently strong that they induce the CEO to allocate too much effort to short-term activities, then we predict that firms will mitigate the implicit incentives by reducing short-term incentives based on earnings, increasing short-term incentives based on annual returns, and increasing long-term compensation in the form of equity grants.

In this study, we find support for the proposition that firms with high levels of transient owners (controlling for the level of long-term institutional investors) reduce the cash bonus contracting weight on earnings, increase the bonus weight on returns, are likely to grant equity, and offer larger grants of equity. This research suggests that the presence of transient investors creates implicit incentives for CEOs to exert effort toward increasing current earnings that, if not mitigated by explicit incentives, may lead to effort that exceeds (i.e., diverges from) the effort level that is optimal for the firm's (long-term) financial returns. Importantly, these findings appear to highlight one setting in which *lower* pay-for-performance sensitivity to earnings represents improved governance in pursuit of long-term value creation.

APPENDIX
VARIABLE DEFINITIONS

%TRA ≡ percentage of shares outstanding held by transient (i.e., short-term) institutional investors per Bushee (1998);

%LT ≡ percentage of shares outstanding held by *dedicated* or *quasi-indexer* (i.e., long-term) institutional investors per Bushee (1998);

ΔlnB ≡ $lnB_t - lnB_{t-1}$, where *B* is the annual cash bonus (in thousands) and *lnB* is natural logarithm of *B*;

lnPORTFOLIO ≡ the sensitivity of the total value of stock and options held by the CEO to a 1 percent change in stock price (Core and Guay 1999, 2002);

lnGrant ≡ natural logarithm of the sum of the sensitivities of grants of stock options and restricted stock made during the year to a 1 percent change in stock price (Core and Guay 1999, 2002);

ΔROE ≡ $ROE_t - ROE_{t-1}$, where *ROE* is the accounting return on equity defined as operating income after depreciation divided by average *BV* of common equity;

RET ≡ annual stock return;

BTM ≡ book-to-market measured as (book value of assets)/(book value of liabilities + market value of equity);

RETIRE ≡ 1 if the CEO is 65 or older, and 0 otherwise;

lnTENURE ≡ natural logarithm of CEO tenure in years;

REL_NOISE ≡ the noise in earnings relative to stock price computed as earnings volatility (standard deviation of annual earnings scaled by average assets over the prior five years) divided by the stock price volatility from the ExecuComp database (standard deviation of monthly price changes over 60 months);
OWN ≡ a measure of CEO's overall ownership in the firm as a percent of total market value (as calculated by ExecuComp);
LOSS ≡ 1 if operating income is negative, and 0 otherwise;
lnMVE ≡ natural logarithm of market value of equity;
lnIRISK ≡ natural logarithm of the standard deviation of the residual from a market model regression estimated over 36 months of returns ending with the fiscal year-end (subject to a minimum of 12 monthly returns) (Core and Guay 1999);
FCF ≡ 0 if *BTM* is less than 1, and is the three-year average of [(cash flow from operations − common and preferred stock dividends)/ total assets] otherwise (Core and Guay 1999);
RESIDUAL ≡ residual from a regression of *lnPORTFOLIO* on its determinants (Table 6);
lnSALES ≡ natural logarithm of sales;
NOL ≡ 1 if the firm has net operating loss carry-forward in any of the three years prior to the year the new equity grant is awarded (Core and Guay 1999);
CF_SHORTFALL ≡ the three-year average of [(common and preferred dividends + cash flow from investing − cash flow from operations)/total assets] (Core and Guay 1999); and
DIV_CONSTRAINT ≡ 1 if in any of the three years prior to the year the new equity grant is awarded [(retained earnings at year-end + cash dividends and stock repurchases during the year)/the prior year's cash dividends and stock repurchases] is less than 2, or if the denominator is 0 for all three years (Core and Guay 1999).

Instruments for *%TRA* and *%LT*
RATE ≡ S&P common stock rating (9 = A+,...,0 = not rated);
TIME ≡ time listed on CRSP tape in years;
SP500 ≡ 1 if the firm is in the S&P 500, and 0 otherwise;
LEVERAGE ≡ debt divided by total assets for prior year;
YIELD ≡ common stock dividend divided by price;
BETA ≡ market model beta estimated from up to 36 prior monthly returns;
LEV ≡ leverage measured as total debt divided by total assets;
SGR ≡ average sales growth over prior three years;
lnBVPS ≡ natural logarithm of book value of assets divided by number of shares outstanding;
REGULATED ≡ 1 if the firm is in a regulated industry, and 0 otherwise;
HITECH ≡ 1 if the firm is in a high technology industry, and 0 otherwise;
$\%TRA^2$, $\%TRA^3$ ≡ squared and cubed *%TRA*, respectively; and
$\%LT^2$, $\%LT^3$ ≡ squared and cubed *%LT*, respectively.

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Appropriate Audit Support System Use: The Influence of Auditor, Audit Team, and Firm Factors

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ABSTRACT: I use Adaptive Structuration Theory (DeSanctis and Poole 1994) and the Theory of Planned Behavior (Ajzen 1991) to model the factors influencing whether auditors use audit support systems appropriately. Understanding the factors that influence appropriate use is important for audit firms to achieve efficient and effective audits from deploying audit support systems. Using a unique data set obtained from 569 auditors, I provide evidence that intention to use the system appropriately and external control increase appropriate use. I find that audit support system restrictiveness and the effectiveness of the audit review process are antecedents of external control. Team and firm consensus on appropriation are antecedents of perceived normative pressure, which, along with an auditor's attitude and self-efficacy, influence an auditor's intention to use the system appropriately. The model is relatively stable across different audit support system designs, but differences are evident across the audit team hierarchy.

Keywords: *audit support systems; appropriate use; system restrictiveness; audit firm control; audit effectiveness and efficiency.*

Data Availability: *Data are available from the author on request subject to ethics requirements. Data were provided on the condition of anonymity; the audit firms will not be identified.*

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I. INTRODUCTION

This study investigates how several auditor, audit team, and audit firm factors influence whether auditors use audit support systems the way audit firms intend them to be used. Audit support systems are the primary technology application audit firms deploy to control, facilitate, and support audit work (Winograd et al. 2000; Manson et al. 2001; Banker et al. 2002; Dowling and Leech 2007). Audit firms promote these systems as essential for facilitating and achieving high-quality financial statement audits.[1] If auditors do not use audit support systems appropriately, then the quality of audited financial statements can suffer, negatively impacting stakeholders who use this information to inform their economic decisions. Therefore, it is crucial that auditors use these systems as their respective audit firms intend. However, prior studies (Kachelmeier and Messier 1990; Messier et al. 2001; Bedard et al. 2003; Bedard et al. 2007) and anecdotal evidence indicate that this is not always the case. Examples of inappropriate audit support system use include deleting recommended/mandatory audit steps, adding irrelevant steps, changing inputs after approval has been obtained, not using the embedded sampling software correctly (e.g., working backward [Kachelmeier and Messier 1990; Messier et al. 2001]), closing review points down before they have been addressed, backdating workpapers, and working around the system (Bedard et al. 2007).

One way audit firms can promote appropriate use is by increasing audit support system restrictiveness, which is "the extent to which an audit support system constrains auditor behavior through prescribing, organizing, and controlling the audit approach" (Dowling and Leech 2007, 97).[2] Although increasing the extent of restrictiveness lowers the risk of an auditor not using the system in the manner intended by the audit firm, the inherent uncertainty of the audit environment (Dirsmith and Covaleski 1985) limits the extent to which audit support systems can be completely restrictive. Audit firms design audit support systems to be suitable for deploying across clients. Although audit firms tailor their systems for specific industries (Dowling and Leech 2007), it is not feasible to design a system to strictly control the audit process across multiple clients. In contrast to systems designed for programmable environments, client differences impose an upper limit on the extent of restrictiveness audit firms can optimally embed within an audit support system. Consequently, all audit firms must accept, to some extent, the risk that auditors do not use their audit support system in the way the design team intended. To manage this risk and achieve high-quality audits, audit firms need to implement strategies that promote the appropriate use of these systems in line with a firm's audit methodology and prescribed auditing standards.

Although several models have been proposed to predict technology acceptance (e.g., The Technology Acceptance Model [Davis et al. 1989] and The Unified Theory of Acceptance and Use of Technology [Venkatesh et al. 2003]), these models focus on whether a system is used, not *how* it is used. Because audit support system use is predominantly mandatory (Dowling and Leech 2007) and governed by a firm's audit methodology and strict professional standards, *how*, not *if*, the system is used is the crucial issue for audit firms to achieve efficient and effective audits through deploying audit support systems. To investigate this important issue, I develop a theoretical model of how several auditor, audit team, and firm-level factors influence appropriate audit support system use. The model extends existing literature by incorporating constructs from Adaptive Structuration Theory (DeSanctis and Poole 1994) as antecedents to constructs from the Theory of Planned Behavior (Ajzen 1991).

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[1] For example, KPMG's (2008) website states: "KPMG's Audit teams are armed with proprietary applications to facilitate a quality audit. KPMG's technology tools provide our teams with a structured, risk-focused workflow that puts industry information at their fingertips and enables team collaboration. These tools are more than simple electronic workpapers; these tools help teams focus on the key risks of your business and drive concise analysis that is fundamental to the financial statement audit."

[2] Silver (1988a, 912) defined system restrictiveness as the "degree to which and the manner in which a decision support system restricts its users' decision-making processes to a particular subset of all possible processes." Subsequent researchers applied the concept of system restrictiveness to other types of information systems. Dowling and Leech (2007) draw upon this literature to develop a definition of audit support system restrictiveness. This broader definition of system restrictiveness is relevant to this study.

I test the theoretical model using data obtained from 569 auditors at the six largest international audit firms that completed field-based survey instruments. I use data from 210 auditors to construct the measurement model and data from a holdout sample of 359 auditors to validate the measurement model and test the structural model. The results support the proposed model for all but one hypothesized path. Consistent with the Theory of Planned Behavior, I find that perceived normative pressure, external control, auditor attitude, and self-efficacy influence intention to use the system appropriately, which in turn influences appropriate use. A significant contribution of this study is the identification of team- and firm-level consensus on appropriation as antecedents of perceived normative pressure, and audit support system restrictiveness and the effectiveness of the audit review process as antecedents of external control. The model is relatively stable across audit support system designs, but I find some differences across the audit team hierarchy.

This study provides guidance to audit firms by identifying the factors that influence how audit support systems are used, and documenting the causal path of how these factors influence appropriate use. The differences in the importance of some factors across the team hierarchy highlight opportunities for audit firms to promote appropriate use.

This study contributes to the accounting literature on monitoring and quality control in accounting firms (e.g., Dirsmith and Covaleski 1985; McNair 1991; Gupta et al. 1994; Otley and Pierce 1996; Morris and Empson 1998; Alvesson and Kärreman 2004; Bedard et al. 2008), audit teams (e.g., King 2002), and the audit review process (e.g., Asare and McDaniel 1996; Tan and Jamal 2001; Brazel et al. 2004) by developing and testing a model that explains how several factors influence auditor behavior. Prior accounting studies highlight the interplay of different control mechanisms on behavior (e.g., Gupta et al. 1994; Pierce and Sweeney 2005). The model I develop contributes to this literature by providing a theoretically grounded framework for understanding how different formal and informal controls influence an individual's behavior.

The theoretical model has implications beyond audit support systems. Information technology has an important role in capturing and evaluating accounting information (Bhimani 2003). The appropriate use of information technology is important to ensure that the captured data accurately and completely reflect the underlying economic events, which has implications for financial statement reliability and decisions made using this information.

Section II develops the theoretical model and the hypotheses. Section III describes the research method. The results are presented and discussed in Section IV, and the conclusions and limitations are presented in Section V.

II. RESEARCH MODEL AND HYPOTHESES

Adaptive Structuration Theory (AST; DeSanctis and Poole 1994) provides a theoretical framework for understanding the factors that influence how a technology is used. AST posits that the way a technology is used reflects several interacting forces: the technology itself, the organization's environment, the perceived social/normative pressures, the task, and the way structures emerge and change throughout the appropriation process (DeSanctis and Poole 1994). A key focus of AST is whether a technology is used faithfully or unfaithfully in relation to how the system is intended to be used (DeSanctis and Poole 1994). In terms of an audit support system, a faithful appropriation occurs when auditors use the audit support system in a manner consistent with how the audit firm intends. In this regard, I conceptualize appropriate use as two ends along a continuum.

In the early stages of the technology appropriation process, how a technology is used changes as users develop a greater understanding of the technology (Majchrzak et al. 2000). Although AST provides insight into this dynamic process, I posit that the constructs that influence the appropriation process persist and continue to influence how the technology is used. Consequently, I focus on understanding the factors influencing how an established audit support system is used. Investigating an established system is important for audit support systems because the "up and out" culture of audit firms implies that the pool of users is constantly changing at the overall firm and task levels. Ensuring that established audit support systems are used appropriately is important for achieving high-quality audits as new auditors are acculturated within the firm and progressing auditors begin using the system for new tasks.

All members of the engagement team use their firm's audit support system. Partners, managers, and senior auditors use the system to plan and review the audit. Staff auditors use the system to guide, control, and document their assigned audit procedures. Team members use the audit support system as a repository to consolidate their team's work into a single audit file that informs and supports the audit opinion. Because the consolidated file reflects how several auditors have independently used the audit support system, it is important that all team members use the system the way the audit firm intends. For this reason, I use the auditor as the unit of analysis. Although DeSanctis and Poole (1994) proposed AST as suitable for various levels of analysis (including at the micro/individual, group, or organization level), AST does not prescribe how constructs influence an individual's technology use. Therefore, I use the Theory of Planned Behavior (TPB; Ajzen 1991) to investigate how auditors perceive constructs from AST and how these perceptions influence how they use their firm's audit support system. The TPB is suitable for use when the individual is the unit of analysis. Substantial empirical evidence supports the validity of the TPB (e.g., Hartwick and Barki 1994; Taylor and Todd 1995; Hanno and Violette 1996; Karahanna and Straub 1999; Terry et al. 1999; Armitage and Conner 2001; Donald and Cooper 2001; Perugini and Bagozzi 2001; Sheeran et al. 2002; Bobek and Hatfield 2003).

The TPB posits that an individual's behavior is a function of his/her intended behavior, which is influenced by an individual's attitude toward the behavior, his/her perception of pressure from "important others" to behave in a manner consistent with the target behavior, and his/her perceived behavioral control (Ajzen 1991). Perceived behavioral control also influences an individual's behavior directly. Figure 1 depicts the TPB as proposed by Ajzen (1991).

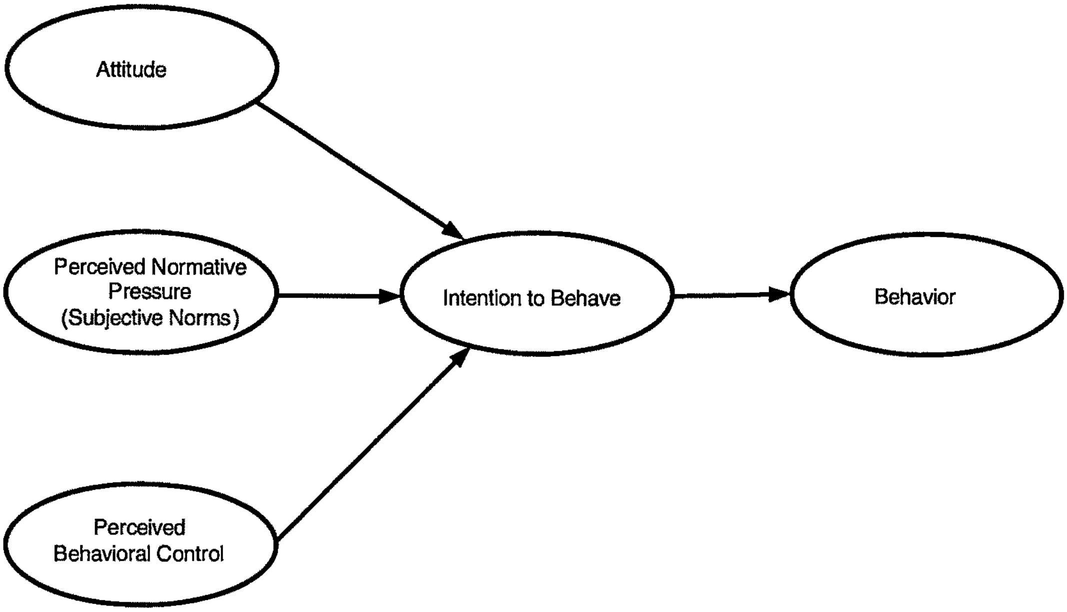
To investigate the factors influencing appropriate audit support system use, I contextualize the TPB antecedents (Figure 1) to this behavior (Hypotheses 1 to 6). I extend the contextualized model by incorporating constructs from AST as antecedents to perceived normative pressure (Hypotheses 7 and 8) and external control (Hypotheses 9 and 10). Figure 2 depicts the extended and contextualized theoretical model. I develop the ten hypotheses in the remainder of this section.

Contextualization of the Theory of Planned Behavior to Appropriate Use

Intended Use

Intention captures an individual's motivation to perform a behavior (Ajzen 1991). Although several factors influence the formation of how an auditor intends to use an audit

FIGURE 1
The Theory of Planned Behavior


Attitude
Perceived Normative Pressure (Subjective Norms)
Perceived Behavioral Control
Intention to Behave
Behavior

Source: Adapted from Ajzen (1991).

support system, the TPB posits that auditors who intend to use the system appropriately are more likely to do so (Ajzen 1991). Therefore, the following hypothesis is proposed:

H1: Intention to use the audit support system appropriately is positively related to using the audit support system appropriately.

Attitude

Auditors who believe that using the audit support system will lead appropriately to outcomes they value are more likely to have a positive attitude to using the system appropriately. Auditors with a positive attitude to using the system appropriately are more likely to form a behavioral intention consistent with their attitude (Ajzen 1991). This reasoning leads to the following hypothesis:

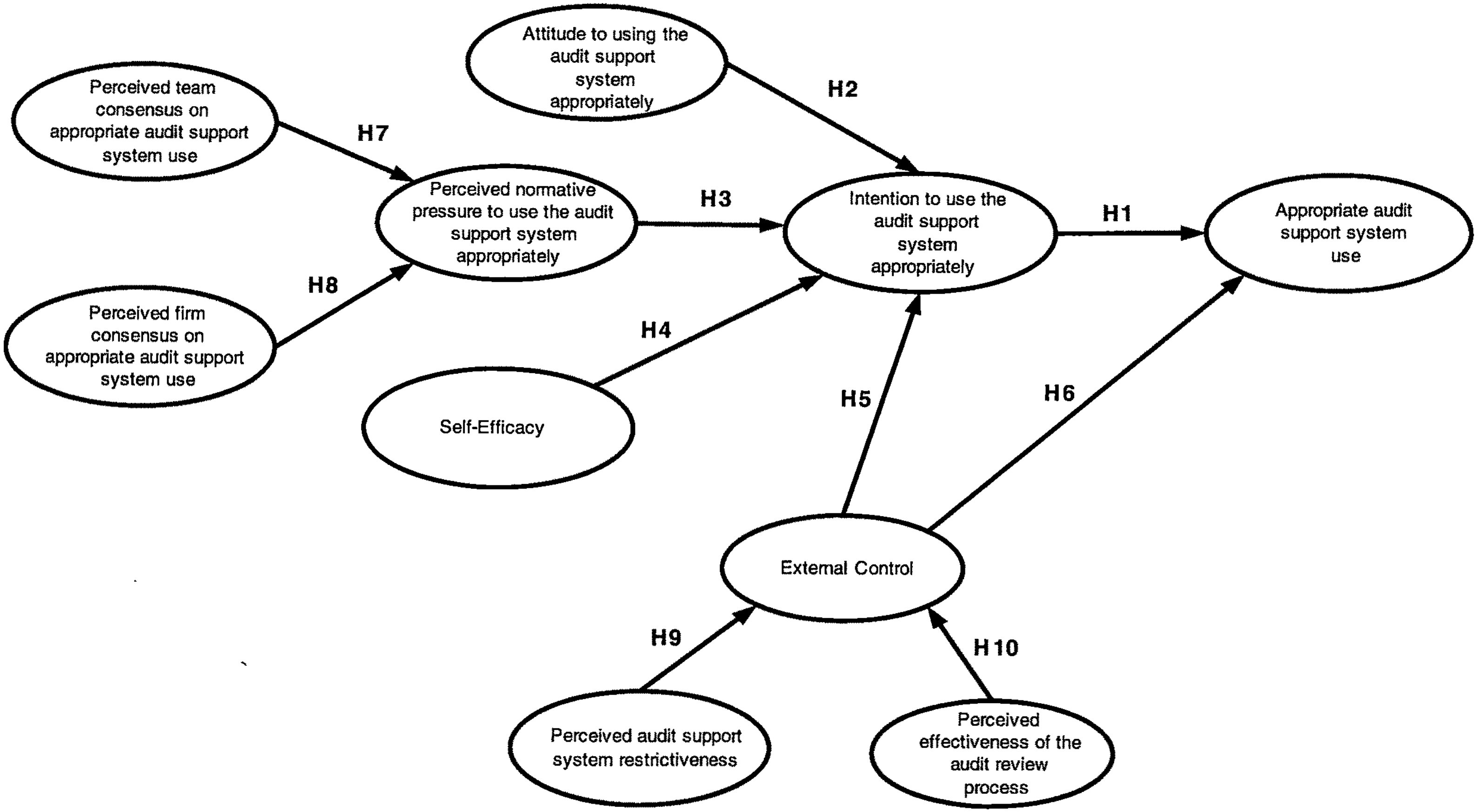
H2: A positive attitude toward using the audit support system appropriately is positively related to intention to use the audit support system appropriately.

Perceived Normative Pressure

An auditor who perceives pressure to use an audit support system appropriately is more likely to form an intention to use the system appropriately (Ajzen 1991). This reasoning leads to the following hypothesis:

H3: Perceived normative pressure to use the audit support system appropriately is positively related to intention to use the audit support system appropriately.

FIGURE 2
Theoretical Model of Factors Influencing Appropriate Audit Support System Use


Attitude to using the audit support system appropriately
Perceived team consensus on appropriate audit support system use
Perceived firm consensus on appropriate audit support system use
Perceived normative pressure to use the audit support system appropriately
Self-Efficacy
Intention to use the audit support system appropriately
Appropriate audit support system use
External Control
Perceived audit support system restrictiveness
Perceived effectiveness of the audit review process
H1
H2
H3
H4
H5
H6
H7
H8
H9
H10

Perceived Behavioral Control

Perceived behavioral control encompasses an individual's perceived self-efficacy and the environmental restraints or resources influencing their behavior (Terry et al. 1999). These components are empirically distinct (Sparks et al. 1997; Armitage et al. 1999; Armitage and Conner 2001; Hagger et al. 2001) and affect behavior and intentions differently (Terry and O'Leary 1995). In contextualizing the TPB, I decompose perceived behavioral control into self-efficacy and external control because they require different interventions to promote appropriate use.

Self-efficacy. Self-efficacy is an individual's belief in his/her ability to perform a behavior within a given context (Bandura 1997, 1982). Individuals with high self-efficacy are confident in their ability because they believe they have the skills to perform the behavior (Ajzen 1991). A meta-analysis of 114 studies supports the positive correlation between self-efficacy and work performance (Stajkovic and Luthans 1998). Self-efficacy improves performance through influencing an individual's effort expenditure and persistence (Bandura 1977, 1997). Individuals with high self-efficacy set higher goals that they are strongly committed to achieving (Wood and Bandura 1989) and are highly motivated (Bandura 1997). The TPB posits that individuals motivated to perform the target behavior are more likely to form an intention consistent with their motivation (Ajzen 1991). This reasoning suggests that as an auditor's self-efficacy to use the audit support system appropriately increases, the auditor is more likely to form an intention to use the system appropriately, leading to the following hypothesis:

> **H4:** Perceived self-efficacy to use the audit support system appropriately is positively related to intention to use the audit support system appropriately.

External control. External control is an individual's perception of environmental resources, controls, and barriers that enable or constrain how they use the audit support system. If an auditor perceives resources are available to use the audit support system appropriately, the TPB predicts that they are likely to form an intention to use the audit support system appropriately (Ajzen 1991). This reasoning leads to the following hypothesis:

> **H5:** External control to use the audit support system appropriately is positively related to intention to use the audit support system appropriately.

External control also directly affects actual behavior (Ajzen 1991). Using a meta-analysis Armitage and Conner (2001) found that external control accounted for a significant component of the variance in actual behavior. I expect this direct relationship to hold in the audit context because irrespective of an auditor's intended behavior, effective controls should promote appropriate use. This reasoning leads to the following hypothesis:

> **H6:** External control to use the audit support system appropriately is positively related to using the audit support system appropriately.

Antecedents from Adaptive Structuration Theory

Consensus on Appropriation: A Source of Perceived Normative Pressure

The TPB captures social pressure from an individual's peers, subordinates, and superiors in perceived normative pressure (Ajzen 1991). However, identifying social pressure as an important informal control within audit firms provides limited guidance for the development of interventions to promote appropriate system use. AST provides this guidance through specifying consensus on appropriation as a social control that influences system use (Salisbury et al. 2002).

Deploying a new system triggers the emergence and development of social rules and structures that influence how individuals use the system (DeSanctis and Poole 1994). When audit firms deploy an audit support system, the expectations of designers and senior audit firm personnel are communicated to users via training sessions, manuals, and the firm's audit methodology (Winograd et al. 2000; Bedard et al. 2003). As users adapt to the new system, they reach a consensus regarding how they should use the system. High consensus reduces uncertainty and increases compliance with group norms (Hackman 1992). Within audit firms, the audit team and firm are two important sources of informal control (Otley and Pierce 1996; Pierce and Sweeney 2005). I include both of these sources as antecedents to perceived normative pressure.

Team consensus on appropriate use. The audit team is a psychological force that influences auditor behavior (King 2002).[3] An auditor who recognizes their audit team members have formed a shared understanding regarding how the audit support system should be used, is likely to feel pressure to use the system in a manner consistent with their team's consensus. However, the type of norm that develops is important.[4] For team consensus to influence appropriate use, audit teams need to reach a consensus that is consistent with how the audit firm intends the system to be used. The stronger their team's consensus on appropriate use, the more likely an auditor will perceive pressure to use the audit support system appropriately. This reasoning leads to the following hypothesis:

> **H7:** Perceived team consensus on appropriate use is positively related to perceived normative pressure to use the audit support system appropriately.

Firm consensus on appropriate use. Audit firms deploy audit support systems across the firm. The reinforcement of firm expectations through interventions such as training, the firm's manuals, and audit methodology will increase firm consensus on appropriate system use (Winograd et al. 2000; Bedard et al. 2003). Higher consensus across the audit firm increases the likelihood an auditor will perceive pressure to use the audit support system in a manner consistent with this consensus. This leads to the following hypothesis:

> **H8:** Perceived firm consensus on appropriate audit support system use is positively related to perceived normative pressure to use the audit support system appropriately.

Sources of External Control

The TPB captures the influence of environmental constraints on an individual's behavior through the construct external control. However, the TPB does not specify sources of external control. For audit firms to develop successful interventions to promote appropriate use, it is important to understand how external control mechanisms influence auditor behavior. AST identifies the technology and task environment as factors that influence the technology appropriation process. In contextualizing the model to the audit context, I include the design of the system and the audit review process as antecedents to external control.

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[3] The term "audit team" normally refers to the set of auditors working on a specific audit engagement (Solomon 1987; Rich et al. 1997). Because auditors often work together on multiple engagements (Asare and McDaniel 1996), the "audit team" an auditor identifies with can extend beyond a specific audit engagement. Consistent with this, I define "audit team" as the social clan of auditors an auditor works with across several audit engagements.

[4] Investigating and understanding norm formation is beyond the scope of this study, which focuses on the influence of existing team (H7) and firm (H8) consensus on appropriate audit support system use.

Audit support system restrictiveness. AST proposes that the structure a technology imposes on users influences how they use the technology (DeSanctis and Poole 1994). One such structure is system restrictiveness (Silver 1988a; DeSanctis and Poole 1994). System restrictiveness is a discretionary structural feature available to audit firms to influence how a system is used. A more restrictive audit support system limits auditors' freedom to choose how they perform the audit and in so doing enforces the firm's audit processes (Dowling and Leech 2007). Auditors in highly structured firms perceive audit tasks to be more analyzable and routine (Bamber et al. 1989). Similarly, I expect auditors who perceive an audit support system as restrictive are more likely to perceive they are working in a highly controlled environment and will use the system in a manner consistent with how they perceive the system to have been designed (Majchrzak et al. 2000). Thus, a more restrictive audit support system promotes appropriate use by constraining users from using the system inappropriately. This leads to the following hypothesis:

> **H9:** Perceived audit support system restrictiveness is positively related to external control to use the audit support system appropriately.

Effectiveness of the audit review process. AST views characteristics of the task and the task setting as important external influences on technology appropriation (DeSanctis and Poole 1994). The audit review process is an important audit-quality control mechanism (Trotman 1985; Trotman and Yetton 1985; Solomon 1987; Ramsay 1994; Asare and McDaniel 1996; Bamber and Ramsay 1997; Reimers and Fennema 1999; Bamber and Ramsay 2000; Tan and Jamal 2001) that provides an opportunity to identify and correct inappropriate use of an audit support system. Auditors who perceive the audit review process to be effective (Gibbins and Newton 1994) are more likely to feel constrained and less likely to engage in dysfunctional behavior (Otley and Pierce 1996), including using the audit support system inappropriately. An auditor's perception of the review process has an *ex ante* affect on auditor behavior (Otley and Pierce 1996; Brazel et al. 2004). Consequently, auditors who expect the review process to be more effective at detecting inappropriate system use are more likely to use the system appropriately. This reasoning leads to the following hypothesis:

> **H10:** Perceived effectiveness of the audit review process is positively related to external control to use the audit support system appropriately.

III. METHOD

Data Collection

I collected data from auditors employed in the Australian offices of the six largest international audit firms. These firms develop and deploy their audit support systems globally. Prior to the start of the audit "busy" season, I collected data on "intention" and its hypothesized antecedents in Figure 2 (Instrument 1). I collected data on "appropriate use" approximately four months later (i.e., post "busy" season; Instrument 2). Using information provided by the audit firms, I sent the instruments directly to auditors or to a contact at each office for distribution. Respondents returned completed instruments in sealed envelopes to me or via an administrative assistant in the smaller offices.[5] Partners encouraged auditor participation and I offered entry into a random prize draw. I sent reminder emails two to three weeks before the closing date of each survey.[6]

I sent Instrument 1 to 1,917 auditors, resulting in 569 usable responses (29.68 percent response rate). I sent Instrument 2 to the 569 respondents, resulting in 359 usable responses (63.88 percent response rate). I use the data from the 210 auditors who responded to Instrument 1 but did not respond to Instrument 2 to construct the measurement model (Group 1). I validate this measurement model and test the structural paths using the data obtained from the 359 auditors who responded to both instruments (Group 2).[7]

Table 1 presents descriptive statistics of both groups. The percentage of auditors in the sample from each firm is reflective of the size of the audit firms; the majority of auditors are from the largest audit firms (Firms A to D). The sample includes auditors of various ranks who normally work on audit teams of various sizes. In both groups, more than 60 percent of the auditors normally work on audit teams that have four to ten members and the majority of auditors are seniors with approximately four to five years experience. Both groups include a nearly equal share of male and female auditors, and the most frequent period of audit support system training is four to ten days.[8] Overall, the sample includes the desired diversity of auditors from various audit firms, who hold various team positions and have different levels of experience.

Development of Measures

I adapt scales from prior TPB studies (e.g., McCaul et al. 1993; Terry and O'Leary 1995; Finlay et al. 1997; Terry et al. 1999; Perugini and Bagozzi 2001; Trafimow et al. 2004) to measure intention, perceived normative pressure, attitude, self-efficacy, and external control. I adapt three items from the faithfulness of appropriation measure (Chin et al. 1997) to capture appropriate use. I measure perceived effectiveness of the audit review process using three items, one of which I adapt from Otley and Pierce (1996). Because a pre-validated scale for measuring system restrictiveness is not available, I develop a scale from a review of relevant studies (Silver 1988b, 1990; DeSanctis and Poole 1994; Wheeler and Valacich 1996; Lynch and Gomaa 2003) and interviews with audit partners and staff regarding their firm's audit support systems. The seven indicators capture differences in the way audit firms have designed their audit support systems to control the audit process.[9] I incorporate a perceived measure of system restrictiveness because a user's perception rather than a third party's measure of system restrictiveness is the more important determinant of how an individual uses a system (Silver 1988b, 1990; Majchrzak et al. 2000). Prior to

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[5] The audit partners determined how the surveys were distributed and collected. Some firms supported sending the survey to all of their auditors in Australia, whereas other firms restricted the administration of the survey to a subset of their auditors.

[6] I assess nonresponse bias by comparing the last 5 percent of respondents against early respondents. Nonresponse bias does not appear to be of significant concern ($n = 210$ Wilks' Lambda $= 0.814$, $F_{(57,152)} = 0.610$; $p > 0.983$; $n = 359$ Wilks' Lambda $= 0.795$, $F_{(72,86)} = 1.025$; $p > 0.433$). The results are qualitatively the same when I compare the last 10 percent of respondents against the early respondents.

[7] Using a holdout sample to test the refined measurement model provides an independent test compared with using data from a single sample to refine and test the structural model.

[8] Training is not significantly correlated with audit firms ($n = 210$: $r = 0.1$, $p > 0.117$; $n = 359$: $r = 0.04$, $p > 0.450$).

[9] These differences emerged during semi-structured interviews (see Dowling and Leech 2007).

TABLE 1
Descriptive Statistics[a]

		Group 1 Auditors Who Responded to Instrument 1 Only (n = 210)		Group 2 Auditors Who Responded to Instrument 1 and Instrument 2 (n = 359)	
		Number	**Percent**	**Number**	**Percent**
Firm	A	69	32.9	59	16.4
	B	43	20.5	76	21.2
	C	61	29.0	73	20.3
	D	23	11.0	79	22.0
	E	7	3.3	35	9.7
	F	7	3.3	37	10.3
Team Size[b]	3 or less	42	20.0	89	24.8
	4 to 10	143	68.1	219	61.0
	11 to 20	16	7.6	38	10.6
	More than 20	9	4.3	12	3.3
Team Position	Graduate	9	4.3	39	10.9
	Junior	36	17.1	67	18.7
	Senior	83	39.5	102	28.4
	Supervisor	34	16.2	45	12.5
	Manager	24	11.4	73	20.3
	Senior Manager	16	7.6	29	8.1
	Other	8	3.8	4	1.1
User Type	Preparer	110	52.4	171	47.6
	Reviewer	31	14.8	59	16.4
	Preparer and Reviewer	69	32.9	129	35.9
Audit Experience	Less than 1 year	13	6.2	44	12.3
	1–less than 2 years	32	15.2	59	16.4
	2–less than 4 years	75	35.7	98	27.3
	4–less than 6 years	49	23.3	75	20.9
	6–less than 9 years	22	10.5	56	15.6
	9–less than 12 years	15	7.1	15	4.2
	12 or more years	4	1.9	12	3.3
Gender	Female	101	48.1	177	49.3
	Male	109	51.9	182	50.7
Training on Audit Support System	Less than 3 days	46	21.9	78	21.7
	4–10 days	92	43.8	144	40.1
	11–20 days	45	21.4	74	20.6
	21–45 days	23	11.0	49	13.6
	More than 45 days	4	1.9	14	3.9

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[a] Collected in instrument 1 (n = 569).

[b] Percentage is less than 100 because of a missing response.

administering the instruments, I conducted several pilot tests to refine the scales.[10] The items, item codes, and descriptive statistics are provided in the Appendix. I measure all constructs using reflective items, except for perceived normative pressure and system restrictiveness, which I measure using formative indicators.[11]

IV. RESULTS AND DISCUSSION

Measurement Model

I use a components-based structural equation modeling technique to validate the measurement model and test the hypotheses.[12] I initially refined the measurement model using data from the 210 auditors who replied to Instrument 1 but did not reply to Instrument 2. I then repeated the steps outlined below using the sample of 359 who responded to both instruments. First, I tested for common method bias, detecting no measurable concern.[13] I conducted confirmatory factor analysis (CFA; Agarwal and Karahanna 2000; Pavlou and Gefen 2005), estimating the model and assessing the significance of the item loadings of the constructs measured with reflective items.[14] This step resulted in the elimination of one item.[15] I re-estimated the remaining items to obtain the standardized factor scores of the constructs measured with reflective items. I obtained cross-loadings by calculating the correlation of the factor scores with the items. Table 2 (Panel A) reports the loadings and cross-loadings. All items load significantly and higher on their respective latent construct than on another latent construct (Chin 1998).[16] The composite reliability scores of the latent constructs reported in Table 2 (Panel B) are all greater than 0.70, indicating acceptable reliability for the measurement of the reflective items for each construct (Nunnaly and Bernstein 1994).[17] Table 3 reports the correlations between the constructs measured with reflective items and the average variance extracted (AVE).[18] All AVEs are higher than 0.50 and their square root is larger than the other correlations (Chin 1998). Taken together, these results support the convergent and divergent validity of the constructs measured with reflective items (Fornell and Larker 1981; Chin 1998).

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[10] I refined the items after each pilot test before seeking further input. I obtained feedback (in order) from ten academics with expertise in accounting, auditing, and/or information systems; two senior auditors from a Big 4 audit firm; 14 auditors from a mid-tier firm; ten academics and doctoral students; eight audit partners and managers from the participating audit firms; and a final pilot test with seven auditors from another mid-tier audit firm. The final sample does not include individuals who participated in the scale development or refinement.

[11] For clarity, I use the term "item" ("indicator") when I measure a construct reflectively (formatively). Reflective items are manifestations of changes in the underlying latent construct. As such, the direction of causality is from construct to items. Reflective items should be interchangeable, have the same antecedents and consequents and be highly correlated (Jarvis et al. 2003; Petter et al. 2007). In contrast, because changes in formative indicators cause changes in the construct, these indicators are generally not interchangeable, are not required to have the same antecedents and consequents or be highly correlated (Jarvis et al. 2003; Petter et al. 2007). I measure perceived normative pressure using four indicators (see the Appendix) that capture an auditor's perception of the expectations of different members of their audit team. I model these indicators as formative because a change in the expectation of a team member will lead to a change in perceived pressure. I model system restrictiveness as formative because it comprises seven indicators that audit firm partners and managers identified as differences in the way their respective audit firms designed their audit support system (see the Appendix). The indicators are unlikely to be correlated because a change in one indicator should not automatically result in a change in all other indicators.

[12] I used PLS Graph 3.0. Partial least squares (PLS) is a component based structural equation modeling (SEM) technique used extensively in the information systems literature (Gefen et al. 2000). I use PLS instead of a covariance based SEM because two of the constructs are measured using formative indicators. Using a covariance based SEM technique to model constructs as formative can result in unidentified models (Kline 2006) or inadmissible solutions (Fornell and Bookstein 1982). Because the two formative constructs in this study (PNORM and SYSRES) each emit only one downstream path, the model is not identified and a covariance based estimation method is not suitable. I therefore use PLS as it is suitable for modeling constructs measured reflectively (Mode A), formatively (Mode B) or a combination of the two (Mode C) (Chin 1998). PLS is a nonparametric approach that does not have strict data distribution requirements, including not requiring the observations to be independent (Chin 1998). I evaluate the significance of the parameter estimates using bootstrapping with 1,000-sample replacement.

[13] I assessed common method bias using Harmon's single-factor test. Neither a single factor emerged from the analysis nor did one "general" factor account for the majority of variance (Podsakoff and Organ 1986). In addition, I conducted a confirmatory factor analysis comparison of the model by loading all reflective items onto a single-factor. The item loadings were all lower when constrained to load onto a single-factor than when the items are loaded onto their respective theoretical construct. This suggests that the theoretical measurement model provides a better fit to the data than a single-factor item. Importantly, prior to data collection, I attempted to minimize the potential for common method bias by collecting the data of the dependent variable, appropriate use, and the antecedent variables at different time periods, protecting respondent's confidentiality, requesting respondents to answer items honestly and conducting several pilot tests to reduce item ambiguity (Podsakoff et al. 2003).

Classical measurement theory testing assumptions are not applicable for assessing formative indicators because there is no expected pattern of inter-relationship (Bollen and Lennox 1991; Diamantopoulos et al. 2008). When assessing construct validity, the indicator weights rather than loadings should be assessed (Chin 1998; Diamantopoulos and Winklhofer 2001; Petter et al. 2007). Table 4 reports the indicator weights for the two constructs measured using formative indicators. Three of the four indicators measuring perceived normative pressure are significant across both groups.[19] However, only one of the seven indicators for system restrictiveness is significant across both groups, and the pattern of the indicator weights differs across the groups.[20] The Variance Inflation Factor

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[14] I performed CFA twice. First, consistent with the traditional method of performing CFA in structural equation modeling, I estimated the measurement model with no relationships specified between the constructs. Second, because the parameter estimates of the measurement items depend upon the structural model being estimated (Chin 1998) I re-performed the CFA with the structural model specified. The loadings of the reflective items are qualitatively similar in both cases. However, the parameter estimates of the formative indicators differ when no structural paths are modeled because PLS allocates an equal weight to each formative indictor. When the structural paths are included, PLS uses an iterative procedure to calculate the best parameter estimates for a construct that will optimally predict the endogenous construct(s) it is theoretically modeled to predict (i.e., the weights of the formative indicators are model dependent [Cenfetelli and Bassellier 2008]). Tables 2, 3, and 4 report the results with the structural paths included in the model.

[15] I eliminated EC1 because it was not contributing information to the construct ($n = 210$: $t = 0.3549$, $p > 0.05$; $n = 359$: $t = 0.3549$, $p > 0.05$; not tabulated). Eliminating EC1 did not alter the significance of the structural paths.

[16] With the exclusion of ATT2, the standardized loadings of all items are greater than 0.70. This indicates that each item shares more variance with the component score than with the error variance (Chin 1998). I retained ATT2 because it loads significantly on ATTITUDE and the average variance extracted exceeds the acceptable cut-off point. When I eliminate ATT2 the results are qualitatively similar to those reported later in the paper.

[17] Composite reliability incorporates the loading weights of the items and provides a more appropriate indication of internal consistency than Cronbach's alpha when the item loadings are not tau-equivalent (Bacon et al. 1995; Salisbury et al. 2002).

[18] AVE measures the amount of variance that a construct captures from its items relative to the amount due to measurement error (Chin 1998).

[19] I conducted a principal components analysis (Petter et al. 2007); the indicators loaded on a single construct.

[20] I investigated the source of this variation by comparing the indicator weights calculated from multiple random samples, each comprising a random 50 percent of the 359 sample. I observed significant within sample variation. To ensure firm or position did not drive the variation I compiled multiple random samples within firm and auditor levels. Again, different weights for the indicators emerged. Consistent with Silver (1988b) this suggests that individual level variation in perceived audit support system restrictiveness is a primary source of the cross-sample variation reported in Table 4. Importantly, the differences in the weights do not appear to affect the significance of the structural paths. For example, the structural path emitted from system restrictiveness to perceived behavioral control is significant in both samples ($n = 210$, $\beta = 0.322$, $t = 4.96$, $p < 0.01$; $n = 359$, $\beta = 0.288$, $t = 4.823$, $p < 0.01$).

TABLE 2
Item Loadings and Cross-Correlations

Panel A: Item Loadings^b and Cross-Loadings^c

	Constructs Measured Using Reflective Items																Constructs Measured Using Formative Indicators^f			
	Attitude		Team Consensus		Firm Consensus		Self-Efficacy		External Control		Audit Review Effectiveness		Intention		Appropriate Use^a		System Restrictiveness		Perceived Normative Pressure	
Reflective Items	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359
ATT1	0.895	0.895	0.498	0.428	0.562	0.512	0.648	0.485	0.524	0.476	0.431	0.390	0.464	0.435	NA	0.326	0.477	0.457	0.542	0.442
ATT2	0.620	0.648	0.203	0.258	0.199	0.228	0.330	0.289	0.211	0.251	0.129	0.194	0.339	0.313	NA	0.261	0.165	0.255	0.303	0.268
ATT3	0.875	0.902	0.458	0.438	0.544	0.526	0.592	0.453	0.539	0.525	0.540	0.485	0.408	0.510	NA	0.283	0.384	0.435	0.489	0.490
TCON1	0.413	0.381	0.850	0.790	0.659	0.532	0.533	0.433	0.542	0.419	0.555	0.401	0.342	0.367	NA	0.428	0.515	0.318	0.665	0.547
TCON2	0.395	0.347	0.777	0.719	0.654	0.562	0.545	0.370	0.512	0.445	0.515	0.341	0.285	0.288	NA	0.311	0.373	0.382	0.577	0.428
TCON3	0.483	0.381	0.912	0.902	0.701	0.595	0.616	0.409	0.556	0.510	0.535	0.414	0.357	0.349	NA	0.346	0.454	0.323	0.740	0.576
TCON4	0.405	0.419	0.886	0.857	0.629	0.590	0.597	0.437	0.527	0.482	0.537	0.383	0.334	0.368	NA	0.310	0.524	0.305	0.696	0.549
FCON1	0.556	0.467	0.691	0.601	0.879	0.837	0.603	0.383	0.583	0.492	0.495	0.478	0.356	0.410	NA	0.278	0.507	0.343	0.667	0.495
FCON2	0.453	0.474	0.707	0.635	0.838	0.853	0.599	0.440	0.569	0.525	0.504	0.452	0.329	0.382	NA	0.334	0.505	0.441	0.628	0.548
FCON3	0.342	0.368	0.542	0.517	0.778	0.761	0.450	0.313	0.471	0.460	0.379	0.450	0.337	0.287	NA	0.244	0.421	0.350	0.476	0.343
FCON4	0.443	0.365	0.541	0.429	0.755	0.706	0.447	0.320	0.549	0.451	0.423	0.325	0.359	0.255	NA	0.304	0.385	0.314	0.584	0.519
SE1	0.600	0.434	0.578	0.459	0.586	0.476	0.875	0.875	0.572	0.435	0.458	0.301	0.354	0.401	NA	0.442	0.505	0.310	0.572	0.453
SE2	0.566	0.495	0.675	0.443	0.643	0.404	0.896	0.846	0.580	0.448	0.527	0.353	0.403	0.370	NA	0.317	0.546	0.291	0.580	0.422
SE3	0.616	0.395	0.537	0.410	0.519	0.332	0.904	0.888	0.534	0.437	0.485	0.266	0.421	0.374	NA	0.377	0.445	0.236	0.534	0.313
EC2	0.536	0.537	0.578	0.540	0.590	0.531	0.649	0.509	0.919	0.912	0.546	0.418	0.438	0.412	NA	0.355	0.490	0.396	0.524	0.433
EC3	0.416	0.379	0.520	0.455	0.605	0.559	0.442	0.373	0.849	0.857	0.437	0.351	0.266	0.293	NA	0.274	0.408	0.351	0.504	0.415
AR1	0.374	0.412	0.485	0.422	0.465	0.454	0.423	0.296	0.464	0.405	0.833	0.858	0.300	0.267	NA	0.199	0.337	0.396	0.405	0.303
AR2	0.443	0.360	0.573	0.369	0.468	0.414	0.536	0.282	0.491	0.317	0.849	0.801	0.353	0.297	NA	0.155	0.454	0.353	0.475	0.247
AR3	0.338	0.350	0.469	0.373	0.441	0.458	0.387	0.295	0.422	0.355	0.776	0.821	0.235	0.278	NA	0.169	0.326	0.321	0.415	0.334
IUSE13	0.505	0.520	0.386	0.420	0.423	0.426	0.442	0.439	0.409	0.405	0.364	0.337	1.000	1.000	NA	0.353	0.359	0.294	0.435	0.450
AUSE13^a	NA	0.285	NA	0.381	NA	0.311	NA	0.389	NA	0.241	NA	0.201	NA	0.329	NA	0.849	NA	0.219	NA	0.344
AUSE14^a	NA	0.254	NA	0.327	NA	0.313	NA	0.330	NA	0.367	NA	0.171	NA	0.211	NA	0.817	NA	0.267	NA	0.336
AUSE15^a	NA	0.353	NA	0.388	NA	0.335	NA	0.404	NA	0.317	NA	0.178	NA	0.362	NA	0.906	NA	0.254	NA	0.351

(*continued on next page*)

TABLE 2 (continued)

Panel B: Reliability for Constructs Measured Using Reflective Items

	Constructs Measured Using Reflective Items																Constructs Measured Using Formative Indicators[f]			
	Attitude		Team Consensus		Firm Consensus		Self-Efficacy		External Control		Audit Review Effectiveness		Intention		Appropriate Use[a]		System Restrictiveness		Perceived Normative Pressure	
Reflective Items	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359	n = 210	n = 359
Composite Reliability[d]	0.845	0.861	0.917	0.891	0.887	0.870	0.921	0.903	0.878	0.878	0.860	0.866	1.000	1.000	NA	0.893	NA	NA	NA	NA
AVE[e]	0.651	0.678	0.735	0.672	0.662	0.626	0.795	0.757	0.783	0.783	0.672	0.684	1.000	1.000	NA	0.736	NA	NA	NA	NA

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[a] The n = 210 sample comprises auditors who only responded to instrument 1 and thus did not answer items measuring Appropriate Use.

[b] Item loadings are estimated in PLS. All item loadings are significant at $p < 0.001$ (two-tailed).

[c] Cross-loadings were obtained by calculating the correlation of the standardized latent variable scores with the standardized value of the item (Agarwal and Karahanna 2000; Pavlou and Gefen 2005).

[d] Composite reliability is a measure of internal consistency that incorporates the loading weights of the items (Bacon et al. 1995; Salisbury et al. 2002).

[e] AVE (Average Variance Extracted) measures the variance shared between a construct and its items relative to measurement error (Chin 1998).

[f] Composite reliability and AVE are not applicable for assessing constructs measured with formative indicators (Chin 1998).

TABLE 3
Construct Correlations and Square Root of Average Variance Extracted[a]
n = 210 above the diagonal; n = 359 sample below the diagonal

	Constructs Measured Using Reflective Items								Constructs Measured Using Formative Indicators[b]	
	Attitude	**Team Consensus**	**Firm Consensus**	**Self-Efficacy**	**External Control**	**Audit Review Effectiveness**	**Intention**	**Appropriate Use[c]**	**System Restrictiveness**	**Perceived Normative Pressure**
Attitude	0.807 0.823	0.495	0.560	0.666	0.545	0.472	0.505	NA	0.442	0.563
Team Consensus	0.466	0.857 0.820	0.769	0.668	0.623	0.623	0.386	NA	0.546	0.784
Firm Consensus	0.534	0.693	0.814 0.791	0.652	0.671	0.558	0.423	NA	0.562	0.732
Self-Efficacy	0.506	0.503	0.466	0.892 0.870	0.630	0.551	0.442	NA	0.512	0.580
External Control	0.526	0.566	0.612	0.505	0.885 0.885	0.561	0.410	NA	0.512	0.580
Audit Review Effectiveness	0.454	0.471	0.535	0.352	0.437	0.820 0.827	0.364	NA	0.457	0.528
Intention	0.520	0.420	0.426	0.439	0.405	0.337	1.000 1.000	NA	0.359	0.435
Appropriate Use	0.349	0.426	0.373	0.437	0.360	0.213	0.353	NA 0.858	NA	NA
System Restrictiveness	0.476	0.399	0.461	0.322	0.424	0.433	0.294	0.288	NA	0.501
Perceived Normative Pressure	0.500	0.645	0.618	0.457	0.479	0.358	0.450	0.400	0.352	NA

(continued on next page)

TABLE 3 (continued)

[a] Average Variance Extracted (AVE) measures the variance a construct captures from its items relative to measurement error. The variance shared by two constructs is the square of the correlation between two constructs. As this table reports the correlations between constructs, the square root of AVE is reported on the diagonal for constructs measured with reflective items. If the square root of AVE is higher than the correlation between the latent variable and the other constructs, the latent variable shares more variance with its measurement items than with the other blocks of items (Chin 1998).

[b] AVE is not applicable for assessing constructs measured with formative indicators (Chin 1998).

[c] Appropriate Use was not collected for the n = 210 sample.

TABLE 4
Formative Indicator Weights

Formative Construct Indicators	n = 210 Indicator Weight (t-statistic)	n = 210 VIF	n = 359 Indicator Weight (t-statistic)	n = 359 VIF
Perceived Normative Pressure				
PTNR2	0.305 (3.883)***	2.311	0.1734 (1.594)	2.401
REVIEW	0.245 (2.561)*	2.380	0.3277 (3.532)***	2.626
MGR2	0.300 (2.937)**	3.140	0.4377 (3.456)***	3.077
GRAD2	0.307 (4.473)***	1.962	0.1973 (2.271)*	1.973
System Restrictiveness				
SR1	0.620 (5.074)***	1.219	0.773 (8.026)***	1.178
SR2	−0.368 (2.743)**	1.262	0.027 (0.200)	1.081
SR3	−0.092 (0.796)	1.098	−0.199 (1.642)	1.055
SR4	0.228 (1.537)	1.131	0.220 (1.834)	1.102
SR5	−0.256 (2.056)*	1.087	−0.047 (0.385)	1.044
SR6	0.340 (2.758)**	1.214	0.222 (1.553)	1.360
SR7	0.081 (0.060)	1.120	0.139 (1.033)	1.291

*, **, *** t-value > 1.96 is significant at the $p < 0.05$ two-tailed, t-value > 2.58 is significant at the $p < 0.01$ two-tailed, and t-value > 3.29 is significant at the $p < 0.001$ two-tailed, respectively.

(VIF) is below 3.3 for all indicators, indicating that multicollinearity is not a major concern (Petter et al. 2007).

There is no clear guidance regarding the optimal treatment for formative indicators that are not significant. Although some recommend removing indicators that are not significant (e.g., Diamantopoulos and Winklhofer 2001), others recommend retaining all indicators because deleting an indicator alters the meaning of the construct (e.g., Bollen and Lennox 1991). Furthermore, because the significance of the indicators is not consistent across and within the two groups, removing indicators based upon one group will alter the construct for empirical rather than theoretical reasons. I developed the seven indicators of system restrictiveness primarily from interviews with partners and mangers at the participating audit firms. Removing indicators would decrease the alignment between the construct and the systems deployed in audit practice. After conducting several sensitivity analyses, I retained all seven indicators. [21] I also retained all four indicators for perceived normative pressure.[22] The results are robust to the inclusion or exclusion of different indicators.

Structural Model

I test the structural model using data from the 359 auditors who responded to both instruments. PLS simultaneously estimates the measurement and structural components of the theoretical model in Figure 2 using four equations. The results reported in Table 5 and Figure 3 support all hypotheses except H5.[23]

Panel A of Table 5 reports the results of the equations that test the contextualized TPB components of the model. The results of Equation B support H1 ($p < 0.001$) and H6 ($p < 0.001$); higher levels of intention to use the audit support system appropriately and external control predict higher levels of appropriate use. Intention is a central construct of the TPB and captures an individual's internal motivation to perform the target behavior. The results of Equation A (Table 5) indicate that auditors who have a positive attitude to using the system appropriately, perceive normative pressure to use the audit support system appropriately, and have higher self-efficacy to use the system appropriately are more likely to form an intention to use the system appropriately. The results of Equation A support H2 ($p < 0.001$), H3 ($p < 0.001$), and H4 ($p < 0.01$), but do not support H5 ($p > 0.05$).

The results reported in Panel B of Table 5 support viewing constructs from AST as antecedents to the contextualized TPB constructs. The results of Equation C indicate that higher levels of team and firm consensus on appropriate use increases perceived normative pressure within audit firms. These findings support H7 ($p < 0.001$) and H8 ($p < 0.001$). The results of Equation D indicate that the deployment of a more restrictive audit support system and an effective review process increase external control. These findings support H9 ($p < 0.001$) and H10 ($p < 0.001$).

Model Robustness

There are significant differences in the audit support systems deployed in practice (Dowling and Leech 2007). Some firms view their systems as enabling the audit process, whereas other firms view their systems as enabling and controlling the audit process. To the extent that system differences proxy for other structural differences, I use system differences to assess the robustness of the model across audit firms.[24] Using the system

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[21] I conducted a principal components analysis. Three components with eigenvalues greater than 1 emerged (not tabulated), and multiple indicators cross-loaded. A review of the indicators suggests that the cross-loadings make theoretical sense, with some indicators mapping onto both the "prescribe" and "control" elements of audit support system restrictiveness. I ran the structural model three times to assess if the results differed for the three components. Each analysis included only the indicators that loaded at greater than 0.4 on the relevant component. All seven indicators were included in at least one component. In all three cases the structural path emitting from system restrictiveness remained significant (Model 1: SR1, SR6, and SR7: $\beta = 0.261$, $t = 4.31$, $p < 0.001$; Model 2: SR3, SR4, and SR5: $\beta = 0.143$, $t = 2.85$, $p < 0.01$; Model 3: SR1, SR2, and SR5: $\beta = 0.259$, $t = 4.52$, $p < 0.001$). This suggests that the results are robust across the overlapping dimensions of audit support system restrictiveness captured by the seven-indicators.

[22] When I exclude PTNR2, the structural paths to and from PNORM remain qualitatively the same (H3: $\beta = 0.189$, $t = 3.14$, $p < 0.001$; H7: $\beta = 0.426$, $t = 5.59$, $p < 0.001$; H8: $\beta = 0.315$, $t = 4.49$, $p < 0.001$).

[23] Because the classification of a construct as formative or reflective requires significant researcher judgment, I tested several alternatives, including estimating the model with all constructs formative, all constructs reflective, and various models with different constructs modeled as formative or reflective (Chwelos et al. 2001). In all cases the results (not tabulated) were similar to those reported; all paths were significant ($p < 0.05$) except for H5. This suggests that the results are not an artifact of modeling a construct as formative or reflective.

[24] I am unable to report the results for individual firms because of confidentiality constraints and the small sample sizes of some firms.

TABLE 5
Partial Least Squares Results
(n = 359)

Panel A: Theory of Planned Behavior Component of Model

Equation	Dependent Variable	Independent Variables	Hypothesis	Standardized Parameter Estimate	t-value	R^2
A	INTENT	ATT	H2	0.306	5.460***	0.344
		PNORM	H3	0.189	3.135***	
		SE-EF	H4	0.162	2.401**	
		EC	H5	0.072	0.931	
B	APUSE	INTENT	H1	0.248	3.733***	0.181
		EC	H6	0.259	4.652***	

Panel B: Adaptive Structuration Theory Antecedent Component of Model

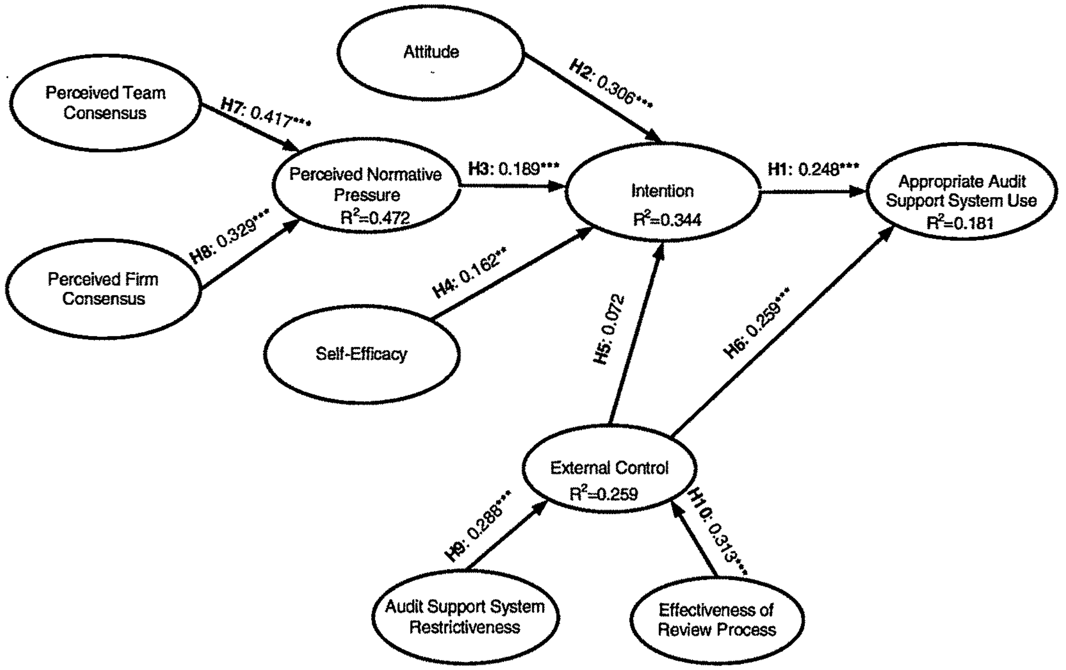
Equation	Dependent Variable	Independent Variables	Hypothesis	Standardized Parameter Estimate	t-value	R^2
C	PNORM	TCON	H7	0.417	5.162***	0.472
		FCON	H8	0.329	4.403***	
D	EC	SYSRES	H9	0.288	4.823***	0.259
		AREV	H10	0.313	4.663***	

, * t-value > 2.33 is significant at the $p < 0.01$ (one-tailed), and t-value > 3.09 is significant at the $p < 0.001$ (one-tailed), respectively.

APUSE = appropriate audit support system use;
AREV = perceived effectiveness of the audit review process;
ATT = attitude to using the audit support system appropriately;
FCON = perceived firm consensus on appropriate audit support system use;
INTENT = intention to use the audit support system appropriately;
EC = external control;
PNORM = perceived normative pressure to use the audit support system appropriately;
SE-EF = self-efficacy;
SYSRES = perceived audit support system restrictiveness; and
TCON = perceived team consensus on appropriate audit system use.

differences documented by Dowling and Leech (2007) I classify four (two) of the audit support systems as having a less (more) restrictive system and estimate models for each group. Table 6 reports the results. For firms deploying a less restrictive audit support system, the results are consistent with the full sample. In contrast, the results for Equation B in Table 6 indicate that intention and external control are not significant predictors of appropriate use in firms deploying a more restrictive system. The mean and variance of the summated appropriate use items (not tabulated) provide some insight to this finding. The mean (variance) is significantly higher (lower) for auditors at firms deploying more restrictive systems than for auditors from firms deploying less restrictive systems. Essentially, deployment of more restrictive systems increases appropriate use through increasing the consistency in how the systems are used. Although intention and external control are not significant in the more restrictive group, the parameter estimates are not significantly different across the two groups, providing support for the model's robustness across different audit support systems deployed in practice. For audit practice, this suggests that the

FIGURE 3
PLS Results
(n = 359)



, * Significant at $p < 0.01$ and $p < 0.001$, respectively, one-tailed.
Figure reports standardized parameter coefficients.

antecedents of appropriate use identified in this study are relevant irrespective of the type of audit support system a firm deploys.[25]

I investigate the robustness of the model across the audit team hierarchy because managers and partners are more likely to work around the system (Bedard et al. 2007) and the influence of training differs across the audit team hierarchy (Bedard et al. 2003). Furthermore, as auditors ascend the audit team hierarchy, the nature and type of audit tasks they perform and their supervisory responsibilities vary. I split the sample into three groups (108 staff auditors, who predominately use the audit support system to prepare workpapers; 102 senior auditors, who predominately use the system to prepare and review workpapers; and 149 manager/supervisors, who predominately use the system to review the audit), and estimate a model for each group.

The results reported in Table 7 highlight that parts of the model are robust across the audit team hierarchy, but that there are some differences. Of the four predictors of intention,

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[25] I split the sample at the median of the factor score calculated from the auditors' responses to the seven indicators measuring audit support system restrictiveness and estimated the model for each group. The parameter paths across the two groups are not significantly different except for H10. In both groups the path is positive and significant, but is more significant in the more restrictive group. This suggests that the model is also robust across user perceived differences in audit support systems.

TABLE 6
Multi-Group Comparison of Structural Paths
Type of Audit Support System Deployed

Panel A: Theory of Planned Behavior Component of Model

Equation	Dependent Variables	Independent Variables	Hypothesis	Standardized Parameter Estimate (t-value; one-tailed)		Difference (t-value; two-tailed)
				Less Restrictive[a] (n = 245)	More Restrictive[a] (n = 114)	
A	INTENT	ATT	H2	0.335 (5.129)***	0.191 (2.007)*	0.144 (1.249)
		PNORM	H3	0.184 (2.750)**	0.224 (1.762)*	−0.040 (0.307)
		SE-EF	H4	0.134 (1.672)*	0.290 (2.963)**	−0.156 (1.157)
		EC	H5	0.086 (0.943)	0.033 (0.128)	0.053 (0.396)
				$R^2 = 0.353$	$R^2 = 0.336$	
B	APUSE	INTENT	H1	0.295 (3.858)***	0.096 (0.789)	0.199 (1.430)
		EC	H6	0.243 (3.825)***	0.239 (1.579)	0.004 (0.029)
				$R^2 = 0.204$	$R^2 = 0.084$	

Panel B: Adaptive Structuration Theory Antecedent Component of Model

Equation	Dependent Variables	Independent Variables	Hypothesis	Standardized Parameter Estimate (t-value; one-tailed)		Difference (t-value; two-tailed)
				Less Restrictive[a] (n = 245)	More Restrictive[a] (n = 114)	
C	PNORM	TCON	H7	0.393 (4.020)***	0.376 (1.910)*	0.017 (0.087)
		FCON	H8	0.319 (3.507)***	0.428 (2.253)*	−0.109 (0.588)
				$R^2 = 0.425$	$R^2 = 0.554$	
D	EC	SYSRES	H9	0.299 (4.524)***	0.349 (4.045)***	−0.050 (0.442)
		AREV	H10	0.282 (3.632)***	0.416 (4.374)***	−0.134 (1.026)
				$R^2 = 0.242$	$R^2 = 0.354$	

(continued on next page)

TABLE 6 (continued)

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*, **, *** t-value > 1.65 (1.96) is significant at the $p < 0.05$ one-tailed (two-tailed), t-value > 2.33 (2.58) is significant at the $p < 0.01$ one-tailed (two-tailed), and t-value > 3.09 (3.29) is significant at the $p < 0.001$ one-tailed (two-tailed), respectively.

[a] I split the sample into less and more restrictive groups based on the audit support system deployed at each participating audit firms. Using Dowling and Leech's (2007) criteria, I classified four (two) of the participating firms were classified as having a less (more) restrictive audit support system.

APUSE = appropriate audit support system use;
AREV = perceived effectiveness of the audit review process;
ATT = attitude to using the audit support system appropriately;
FCON = perceived firm consensus on appropriate audit support system use;
INTENT = intention to use the audit support system appropriately;
EC = external control;
PNORM = perceived normative pressure to use the audit support system appropriately;
SE-EF = self-efficacy;
SYSRES = perceived audit support system restrictiveness; and
TCON = perceived team consensus on appropriate audit system use.

TABLE 7
Multi-Group Comparison of Structural Paths
Position in Audit Team

Panel A: Theory of Planned Behavior Component of Model

				Standardized Parameter Estimate (t-value; one-tailed)		
Equation	**Dependent Variables**	**Independent Variables**	**Hypothesis**	**Staff (n = 108)**	**Seniors (n = 102)**	**Manager/Supervisors (n = 149)**
A	INTENT	ATT	H2	0.326 (3.339)***	0.286 (2.407)***	0.266 (2.471)**
		PNORM	H3	0.321 (3.101)***[a]	0.006 (0.055)[a]	0.247 (2.652)**
		SE-EF	H4	0.311 (3.649)***	0.086 (0.784)	0.163 (1.309)
		EC	H5	−0.171 (1.615)[a]	0.288 (2.123)*[a]	0.022 (0.192)
				$R^2 = 0.504$	$R^2 = 0.321$	$R^2 = 0.309$
B	APUSE	INTENT	H1	0.181 (1.196)	0.248 (1.911)**	0.318 (3.976)***
		EC	H6	0.326 (3.205)***	0.347 (2.917)**	0.213 (2.789)**
				$R^2 = 0.188$	$R^2 = 0.270$	$R^2 = 0.189$

Panel B: Adaptive Structuration Theory Antecedent Component of Model

				Standardized Parameter Estimate (t-value; one-tailed)		
Equation	**Dependent Variables**	**Independent Variables**	**Hypothesis**	**Staff (n = 108)**	**Seniors (n = 102)**	**Manager/Supervisors (n = 149)**
C	PNORM	TCON	H7	0.662 (5.903)***[b]	0.468 (3.297)***	0.229 (2.001)**[b]
		FCON	H8	0.187 (1.588)	0.313 (2.397)**	0.441 (4.454)***
				$R^2 = 0.662$	$R^2 = 0.512$	$R^2 = 0.383$
D	EC	SYSRES	H9	0.366 (4.283)***	0.371 (3.180)***	0.367 (5.404)***
		AREV	H10	0.324 (3.522)***	0.411 (3.456)***	0.225 (2.419)**
				$R^2 = 0.354$	$R^2 = 0.466$	$R^2 = 0.225$

(*continued on next page*)

TABLE 7 (continued)

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*, **, *** t-value > 1.65 is significant at the $p < 0.05$ one-tailed, t-value > 2.33 is significant at the $p < 0.01$ one-tailed, and t-value > 3.09 is significant at the $p < 0.001$ one-tailed, respectively.

[a] Parameter difference is significant ($p < 0.05$, two-tailed): Staff versus Seniors.

[b] Parameter difference is significant ($p < 0.05$, two-tailed): Staff versus Managers.

APUSE = appropriate audit support system use;
AREV = perceived effectiveness of the audit review process;
ATT = attitude to using the audit support system appropriately;
FCON = perceived firm consensus on appropriate audit support system use;
INTENT = intention to use the audit support system appropriately;
EC = external control;
PNORM = perceived normative pressure to use the audit support system appropriately;
SE-EF = self-efficacy;
SYSRES = perceived audit support system restrictiveness; and
TCON = perceived team consensus on appropriate audit system use.

only attitude (H2) is significant across all three groups. Perceived normative pressure (H3) is not significant for seniors. In contrast to the other groups, external control is a significant predictor of intention for senior auditors (H5). The significance of external control for senior auditors reflects the nature of their audit tasks, including their responsibility for reviewing the more structured tasks completed by staff auditors (Abdolmohammadi 1999; Ramsay 1994). Unlike managers who perform conceptual reviews, senior auditors perform detailed, mechanical reviews with a focus on technical accuracy and completeness (Ramsay 1994). The results suggest that senior auditors who intend to use the audit support system appropriately internalize the firm's external controls.

Unlike the results for the full sample, self-efficacy (H4) is only a significant predictor of intention for staff auditors. This suggests that audit firms can promote appropriate use for staff auditors by implementing mechanisms that increase self-efficacy, such as training (Bedard et al. 2003). The nonsignificant results for managers and seniors likely reflect the complexity of the tasks they complete using the system.[26] The influence of self-efficacy on work performance decreases as task complexity increases (Stajkovic and Luthans 1998).

Consistent with the full sample, audit support system restrictiveness (H10) and an effective audit review process (H9) are positive and significant antecedents for external control for all three groups. However, the influence of team (H7) and firm (H8) consensus on appropriate use differ. Although team consensus on appropriate use is positive and significant across all three groups, the coefficient significantly decreases from staff (0.662, $p < 0.001$) to managers (0.229, $p < 0.01$). In contrast, the coefficient of firm consensus on appropriate use increases from staff (0.187, $p > 0.05$) to managers (0.441, $p < 0.001$). The opposite trends for team and firm consensus on appropriate use highlight that managers are an important communicator of a firm's consensus on appropriate use. Thus, it is important that managers are conversant with how their firm intends the system to be used.

V. CONCLUSION

I model several antecedents that influence whether auditors use audit support systems appropriately. Appropriate use is using the system in a manner consistent with how the audit firm intends. I develop and test a theoretical model grounded in the Theory of Planned Behavior (TPB; Ajzen 1991) and Adaptive Structuration Theory (AST; DeSanctis and Poole 1994). Consistent with the TPB, I find attitude, perceived normative pressure, and self-efficacy predict an auditor's intention to use an audit support system appropriately, and intention and external control predict appropriate audit support system use. However, the influence of some factors differs across the audit team hierarchy. Perceived normative pressure is not significant for senior auditors, self-efficacy is only significant for staff auditors, but intention is not significant for staff auditors. The differences highlight opportunities for audit firms to develop interventions to promote appropriate use across the team hierarchy.

This study extends the literature investigating audit support system use by identifying constructs from AST as antecedents to perceived normative pressure and external control. I find system restrictiveness and the effectiveness of the audit review process to be important sources of external control, and team and firm consensus on appropriate use to be sources of perceived normative pressure. However, the influence of team and firm consensus on appropriation differs across the team hierarchy. The results highlight that managers are an important communicator of a firm's consensus on appropriation to the audit team.

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[26] For example, seniors and managers use the audit support system to review workpapers; a task auditors perceive as complex in an electronic environment (Brazel et al. 2004; Bedard et al. 2007).

This study provides guidance for audit firms by highlighting the importance of developing and promoting informal controls that auditors internalize. Developing a firm culture that promotes informal normative controls that auditors assimilate as their own is important, as auditors draw upon these informal and social controls in self-regulating and determining their behavior. For audit firms, an important finding is that, in contrast to expectations, external controls are not a significant predictor of intention to use the audit support system appropriately. Self-determination theory (Deci and Ryan 1985) provides some insights into understanding the broader implications of this finding.[27] Self-determination theory differentiates between two types of internalization: introjection and integration. Introjection occurs when an individual accepts and behaves in a manner consistent with the external control, but does not take it as one's own (Deci et al. 1994). Integration occurs when individuals internally assimilate an external control as their own (Deci et al. 1994). I find that although external controls directly influence auditor behavior, audit staff and managers do not internalize these control mechanisms. The across-firm analysis and the nonsignificance of intention on appropriate use in firms using more restrictive systems indicates that this issue is more problematic as audit support system restrictiveness increases. In response to increasing regulatory pressure, three of the Big 4 audit firms are in the process of developing more restrictive audit support systems.[28] On the one hand, the results in this study support this move, as they provide evidence that increasing external controls directly improves appropriate system use. However, because internalization is important for giving meaning to a control and improving its behavioral effect (Morris and Empson 1998), finding that auditors do not internalize external controls raises concerns about increasing audit support system restrictiveness that potentially imposes other long-term costs. For example, when required to perform a task without the assistance of their firm's audit support system, auditors who use a more restrictive system perform at a lower level than auditors who use a less restrictive system (Dowling et al. 2008).

The results suggest that as an alternative to deploying a more restrictive audit support system, audit firms can achieve similar control benefits by inducing a higher level of perceived system restrictiveness. I find perceived restrictiveness to be an important antecedent in firms deploying more and less restrictive systems, suggesting that firms deploying a less restrictive system can induce a higher level of perceived restrictiveness. Perceived system restrictiveness is a function of a system's actual restrictiveness and the user's awareness and skills (Anson et al. 1995) and can be induced through active (e.g., facilitators) or passive (e.g., training) mediators (Wheeler and Valacich 1996). Although I find that perceived restrictiveness is an important antecedent across the audit team hierarchy and audit support systems that differ in their actual level of restrictiveness, I did not collect data to explain the factors driving an auditor's perception of audit support system restrictiveness. An understanding of these factors would be a valuable extension of this study, as it would provide audit firms with insights to obtain the control benefits of system restrictiveness in a more flexible way through perceived rather than actual system restrictiveness.

The results are subject to the following limitations. The sample included auditors from the six largest audit firms, all of the Big 4 audit firms, and two international mid-tier firms. Potential differences between Big 4 and non-Big 4 audit firms (see Francis 2004) suggest that there may be differences across the participating firms. I am unable to report separate analyses at the firm level for confidentiality reasons. Furthermore, the respondents are nested within audit firms. Although the statistical method I use does not require independent observations (Chin 1998), it also does not support multi-level analysis. Thus, I am unable to hold firm-level variance constant.

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[27] I thank an anonymous reviewer for suggesting this connection.

[28] I obtained this information during recent informal discussions with auditors at these firms.

To increase the generalizability of the model I measure appropriate use across multiple engagements. Consequently, the model does not include client- or engagement-specific factors that may influence appropriate use. Time budgets are one potentially important client-specific control mechanism not included (McNair 1991; Otley and Pierce 1996). Budget pressure can induce dysfunctional auditor behavior (Coram et al. 2004) and may moderate whether auditors on a specific engagement act in a manner consistent with their general intention.

The survey instruments included several ethically sensitive items. Although I attempted to minimize the potential for bias by including a cover statement asking respondents to answer honestly, ensuring the confidentiality of respondents, and providing post-paid return envelopes, I cannot rule out the potential that the nature of some of the items induced bias. Although not completely mitigated, the fact that respondents provided a range of responses for the items reduces this concern (see the Appendix).

Despite these caveats, this study contributes to the accounting literature by developing and testing a model grounded in two established theories that explain how a set of interrelated antecedents influence whether auditors use their firms' audit support systems in the manner intended. The model provides a structured framework for investigating how several formal and informal control mechanisms influence auditor behavior. Understanding how different factors influence auditor behavior is important because effective audits are characterized by the successful interplay of different controls (Gupta et al. 1994; Pierce and Sweeney 2005). Although I contextualize the model in the specific behavior of audit support system use, the model is suitable for tailoring to investigate other antecedents, behaviors, and/or different technological tools. As such, the model developed and tested in this study can be adapted to provide important insights into other behaviors of interest to accounting researchers.

APPENDIX
Constructs, Items, Item Codes, and Descriptive Statistics

Panel A: Constructs Measured Using Reflective Items

Item Code	Item	Min. (n = 359)	Max. (n = 359)	Mean (Std. Dev.) (n = 359)	Mean (Std. Dev.) (n = 210)
Appropriate Use (AUSE)					
Only AUSE13, AUSE14, and AUSE15 are used in the measurement model (see Note A at end of table).					
AUSE1	Consulted with audit team members when *not* sure how to use your firm's audit support system	1	7	4.53 (1.581)	NA
AUSE2	Provided answers to checklist questions in your firm's audit support system when you were *not* confident as to the "true" answer (R)	1	7	5.29 (1.515)	NA

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APPENDIX (continued)

Item Code	Item	Min. (n = 359)	Max. (n = 359)	Mean (Std. Dev.) (n = 359)	Mean (Std. Dev.) (n = 210)
AUSE3	Knowingly provided incorrect answers to checklist questions in your firm's audit support system (R)	2	7	6.60 (0.866)	NA
AUSE4	Used your firm's audit support system's help function when you were unsure how to use the system	1	7	3.33 (1.730)	NA
AUSE5	Changed or deleted difficult to complete audit steps generated in your firm's audit support system (R)	1	7	6.37 (1.065)	NA
AUSE6	Changed or deleted inefficient to complete audit steps generated in your firm's audit support system (R)	1	7	5.18 (1.689)	NA
AUSE7	Completed steps in your firm's audit support system after the work was signed off (R)	1	7	5.61 (1.576)	NA
AUSE8	Documented additional work in a review note instead of the working papers contained in your firm's audit support system (R)	1	7	5.97 (1.421)	NA
AUSE9	Backdated workpapers contained in your firm's audit support system (R)	1	7	6.19 (1.356)	NA
AUSE10	Completed all audit steps generated in your firm's audit support system	1	7	5.28 (1.536)	NA
AUSE11	Logged on to your firm's audit support system as someone else (R)	2	7	6.24 (1.326)	NA
AUSE12	Signed off an audit step as completed in your firm's audit support system when it had *not* been completed (R)	2	7	6.46 (0.962)	NA
AUSE13	Used your firm's audit support system in the way your audit firm intends the system to be used	1	7	5.54 (1.200)	NA
AUSE14	During the last 3–4 months there have been times when I did *not* use my firm's audit support system as it should have been used (R)	1	7	5.14 (1.622)	NA
AUSE15	My use of my firm's audit support system was consistent with how my audit firm expects the system to be used	1	7	5.57 (1.194)	NA

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APPENDIX (continued)

Item Code	Item	Min. (n = 359)	Max. (n = 359)	Mean (Std. Dev.) (n = 359)	Mean (Std. Dev.) (n = 210)
Intention to Use the Audit Support System Appropriately (INTENT)					
Only USE13 is used in the measurement model (see Note B at end of table).					
IUSE1	Consult with audit team members when you are *not* sure how to use your firm's audit support system	3	7	5.88 (0.964)	5.84 (1.018)
IUSE2	Provide answers to checklist questions in your firm's audit support system when you are *not* confident as to the "true" answer (R)	1	7	4.76 (1.657)	4.77 (1.647)
IUSE3	Knowingly provide incorrect answers to checklist questions in your firm's audit support system (R)	1	7	6.43 (1.054)	6.34 (1.200)
IUSE4	Use your firm's audit support system's help function when you are unsure how to use the system	1	7	4.50 (1.688)	4.85 (1.544)
IUSE5	Change or delete difficult to complete audit steps generated in your firm's audit support system (R)	1	7	6.20 (1.167)	6.09 (1.231)
IUSE6	Change or delete inefficient to complete audit steps generated in your firm's audit support system (R)	1	7	4.91 (1.718)	4.77 (1.763)
IUSE7	Complete steps in your firm's audit support system after the work is signed off (R)	1	7	5.52 (1.533)	5.54 (1.513)
IUSE8	Document additional work in a review note instead of the working papers contained in your firm's audit support system (R)	1	7	5.60 (1.561)	5.34 (1.668)
IUSE9	Backdate workpapers contained in your firm's audit support system (R)	1	7	6.09 (1.308)	6.13 (1.362)
IUSE10	Complete all audit steps generated in your firm's audit support system	1	7	5.64 (1.381)	5.45 (1.580)
IUSE11	Log on to your firm's audit support system as someone else (R)	1	7	6.09 (1.421)	6.37 (1.303)
IUSE12	Sign off an audit step as completed in your firm's audit support system when it has *not* been completed (R)	1	7	6.39 (1.021)	6.35 (1.119)
IUSE13	Use your firm's audit support system in the way your audit firm intends the system to be used	1	7	5.86 (1.004)	5.74 (1.179)

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APPENDIX (continued)

Item Code	Item	Min. (n = 359)	Max. (n = 359)	Mean (Std. Dev.) (n = 359)	Mean (Std. Dev.) (n = 210)
Attitude (ATT)					
ATT1	Using my firm's audit support system the way my audit firm intends the system to be used is beneficial to me	1	7	5.65 (1.085)	5.56 (1.084)
ATT2	Using my firm's audit support system the way my audit firm intends the system to be used is useless to me (R)	1	7	5.80 (1.357)	5.41 (1.588)
ATT3	Using my firm's audit support system the way my audit firm intends the system to be used is good for me	1	7	5.54 (1.004)	5.39 (1.058)
Perceived Normative Pressure to Use the Audit Support System Appropriately (PNORM) Only PTNR2, REVIEWER1, MGR2, and GRAD2 are used in the measurement model (see Note C at end of table).					
PTNR1	My audit team partner always *uses* our firm's audit support system the way our audit firm intends the system to be used	1	7	4.98 (1.586)	4.99 (1.487)
PTNR2	The partner(s) in my audit team always *expect* me to use our firm's audit support system the way our audit firm intends the system to be used	1	7	5.70 (1.359)	5.65 (1.290)
REVIEWER1	The audit team person who reviews my work always *expects* me to use our firm's audit support system the way our audit firm intends the system to be used	1	7	5.66 (1.334)	5.47 (1.370)
MGR1	The manager(s) in my audit team always *use* our firm's audit support system the way our audit firm intends the system to be used	1	7	5.21 (1.461)	5.11 (1.416)
MGR2	The managers in my audit team always *expect* me to use our firm's audit support system the way our audit firm intends the system to be used	1	7	5.68 (1.194)	5.61 (1.182)
SEN1	The senior(s) in my audit team always *use* our audit support system the way our audit firm intends the system to be used	1	7	5.53 (1.184)	5.43 (1.315)

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APPENDIX (continued)

Item Code	Item	Min. (n = 359)	Max. (n = 359)	Mean (Std. Dev.) (n = 359)	Mean (Std. Dev.) (n = 210)
GRAD1	The graduate/junior(s) in my audit team always *use* our firm's audit support system the way our audit firm intends the system to be used	1	7	4.87 (1.329)	4.83 (1.245)
GRAD2	The graduate/junior auditor(s) in my audit team always *expect* me to use our firm's audit support system the way our audit firm intends the system to be used	1	7	5.36 (1.308)	5.32 (1.279)
Team Consensus on Appropriate Use (TCON)					
TCON1	There is mutual understanding in my audit team regarding the appropriate use of our firm's audit support system	1	7	5.53 (1.077)	5.22 (1.256)
TCON2	There is *no* conflict in my audit team regarding the appropriate use of our firm's audit support system	1	7	5.12 (1.379)	5.07 (1.406)
TCON3	Overall, members of my audit team agree on the appropriate use of our firm's audit support system	1	7	5.48 (1.085)	5.44 (1.128)
TCON4	My audit team has reached a consensus on the appropriate use of our firm's audit support system	1	7	5.49 (1.054)	5.35 (1.182)
Firm Consensus on Appropriate Use (FCON)					
FCON1	Overall employees in my audit firm agree on the appropriate use of our firm's audit support system	1	7	5.20 (1.181)	5.17 (1.132)
FCON2	Mutual understanding exists in my audit firm regarding the appropriate use of our firm's audit support system	2	7	5.18 (1.173)	5.12 (1.219)
FCON3	There is no conflict in my audit firm regarding the appropriate use of our firm's audit support system	1	7	4.46 (1.447)	4.43 (1.427)
FCON4	Irrespective of the audit team I am assigned to, I am expected to use my firm's audit support system in the same way for the same type of task	1	7	5.22 (1.508)	5.00 (1.570)

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APPENDIX (continued)

Item Code	Item	Min. (n = 359)	Max. (n = 359)	Mean (Std. Dev.) (n = 359)	Mean (Std. Dev.) (n = 210)
Self-Efficacy (SE-EF)					
SE1	I am very confident in my ability to use my firm's audit support system in the way my audit firm intends the system to be used	1	7	5.43 (1.156)	5.33 (1.226)
SE2	I have the ability to use my firm's audit support system in the way my audit firm intends the audit support system to be used	2	7	5.75 (0.944)	5.54 (1.154)
SE3	I have the skills to use my firm's audit support system in the way my audit firm intends the system to be used	1	7	5.54 (1.043)	5.45 (1.124)
External Control (EC)					
EC1	I have total control as to whether I use my firm's audit support system in the way my audit firm intends the system to be used	1	7	3.64 (1.662)	3.47 (1.497)
EC2	I have access to the resources I need to use my firm's audit support system in the way my audit firm intends me to use it	1	7	5.58 (1.148)	5.46 (1.058)
EC3	There are *no* barriers to my using my firm's audit support system in the way my audit firm intends me to use it	1	7	4.69 (1.610)	4.65 (1.537)
Perceived Effectiveness of the Audit Review Process (AREV)					
AR1	The audit review process at my audit firm is able to frequently identify any mistakes/errors/omissions that I have made using my firm's audit support system	1	7	5.30 (1.251)	5.24 (1.111)
AR2	The audit review process at my audit firm is generally effective	2	7	5.72 (1.011)	5.57 (1.061)
AR3	The audit review process at my audit firm is, in general, effective at detecting when our firm's audit support system is *not* used in a manner consistent with how my audit firm expects the system to be used	1	7	5.04 (1.270)	5.10 (1.205)

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APPENDIX (continued)

Panel B: Constructs Measured using Formative Indicators

Item Code	Item	Min. (n = 359)	Max. (n = 359)	Mean (Std. Dev.) (n = 359)	Mean (Std. Dev.) (n = 210)
Perceived Audit Support System Restrictiveness (SYSRES)					
SR_PEU is not used in the measurement model (see Note C at end of table).					
SR_PEU	My firm's audit support system is easy to use	1	7	5.17 (1.123)	5.17 (1.161)
SR1	My firm's audit support system can readily be tailored to any client	1	7	5.22 (1.045)	5.11 (1.160)
SR2	Users can readily change or delete audit steps after the audit program has been generated in my firm's audit support system (R)	1	7	2.75 (1.408)	2.91 (1.555)
SR3	It is easy to change/alter the date on previously completed working papers contained in my firm's audit support system (R)	1	7	3.50 (1.936)	4.01 (1.959)
SR4	My firm's audit support system automatically generates audit work programs	1	7	4.83 (1.622)	4.81 (1.599)
SR5	My firm's audit support system constrains how users perform an audit	1	7	4.07 (1.491)	4.05 (1.420)
SR6	Users are required to justify in the audit support system any changes made to audit steps generated in my firm's audit support system	1	7	4.25 (1.662)	4.21 (1.606)
SR7	The audit support system contains compulsory audit steps which cannot be changed or deleted	1	7	4.59 (1.932)	4.83 (1.811)
Perceived Normative Pressure to Use the Audit Support System Appropriately (PNORM)					
Only PTNR2, REVIEWER1, MGR2, and GRAD2 are used in the measurement model (see Note D at end of table).					
PTNR1	My audit team partner always *uses* our firm's audit support system the way our audit firm intends the system to be used	1	7	4.98 (1.586)	4.99 (1.487)
PTNR2	The partner(s) in my audit team always *expect* me to use our firm's audit support system the way our audit firm intends the system to be used	1	7	5.70 (1.359)	5.65 (1.290)
REVIEWER1	The audit team person who reviews my work always *expects* me to use our firm's audit support system the way our audit firm intends the system to be used	1	7	5.66 (1.334)	5.47 (1.370)

(*continued on next page*)

APPENDIX (continued)

Item Code	Item	Min. (n = 359)	Max. (n = 359)	Mean (Std. Dev.) (n = 359)	Mean (Std. Dev.) (n = 210)
MGR1	The manager(s) in my audit team always *use* our firm's audit support system the way our audit firm intends the system to be used	1	7	5.21 (1.461)	5.11 (1.416)
MGR2	The managers in my audit team always *expect* me to use our firm's audit support system the way our audit firm intends the system to be used	1	7	5.68 (1.194)	5.61 (1.182)
SEN1	The senior(s) in my audit team always *use* our audit support system the way our audit firm intends the system to be used	1	7	5.53 (1.184)	5.43 (1.315)
GRAD1	The graduate/junior(s) in my audit team always *use* our firm's audit support system the way our audit firm intends the system to be used	1	7	4.87 (1.329)	4.83 (1.245)
GRAD2	The graduate/junior auditor(s) in my audit team always *expect* me to use our firm's audit support system the way our audit firm intends the system to be used	1	7	5.36 (1.308)	5.32 (1.279)

(R) = item is reverse coded.

All items were measured on a scale of 1 to 7. Items measuring appropriate use (AUSE) and intended use (INTENT) were anchored with 7 = To a great extent and 1 = Not at all. All other items were anchored with 7 = Strongly agree and 1 = Strongly disagree.

Note A: Twelve items (AUSE1 to AUSE12) preceded the three items measuring appropriate use. I included the 12 items to prompt auditors to consider specific ways in which they used the audit support system before they answered the three items measuring their overall appropriate use. The inclusion of the 12 prompting items is a cognitive technique to improve respondents' recall (Dillman 2000). Feedback received during the initial instrument development indicated that including prompting items would help respondents provide more accurate responses.

Note B: IUSE13 was collected as part of a 12-page instrument. Feedback from focus group participants indicated that when respondents understood the meaning of "appropriate use" including more than one item to measure intended appropriate use was redundant. Based on this feedback and the length of instrument 1, I measured intention to use the audit support system appropriately with a single item preceded by 12 items referring to specific behaviors (IUSE1 to IUSE12). Therefore, I treat IUSE13 as an observed variable in the statistical analysis.

Note C: SR_PEU captures ease of use. In relation to the theoretical definition of system restrictiveness, ease of use is not relevant and I did not include it in the measurement model. I included it in the instrument because the indicators measuring system restrictiveness were the first questions respondents answered. SR_PEU satisfies Dillman's (2000) recommendation that the first question is easy to answer and applicable to all respondents.

Note D: Consistent with Ajzen's (2002) recommendation I captured perceived normative pressure using two sets of indicators that differ in terms of whether a respondent was asked to report how they perceived "an important other" *expected* them to use the system (PTNR2, REVIEWER1, MGR2, GRAD2) or how they perceived "an important other" *used* the system (PTNR1, MGR1, SEN1, GRAD1). I estimated a two-factor model and each set of indicators is capturing the same underlying latent construct (r = 0.8). To reduce the complexity of the final model, I measure perceived normative pressure using the four "expected" use indicators as these are the most aligned with the theoretical construct of perceived normative pressure.

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Do Strategic Reasoning and Brainstorming Help Auditors Change Their Standard Audit Procedures in Response to Fraud Risk?

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ABSTRACT: The Public Company Accounting Oversight Board recently reported that its inspections show that auditors fail to effectively modify their standard audit procedures in response to fraud risk. Prior academic research is consistent with this finding. Our study examines the effects of two interventions on auditors' planning decisions in a high-fraud-risk setting: strategic reasoning and brainstorming in groups. Both interventions are predicted to lead auditors to more effectively modify their planned audit procedures. We use a panel of fraud experts to identify effective modifications to the audit plan of a specific fraud case. The experts' recommendations are then used to evaluate the effectiveness of practicing auditors' audit plans with and without the two interventions. We predict and find that each intervention leads to more effective modifications to the standard audit procedures and that the combination of the interventions is not significantly more effective than either intervention used alone.

Keywords: *audit planning; fraud risk; nature of audit procedures; strategic reasoning; brainstorming.*

Data Availability: *The data used in this study are available upon request.*

I. INTRODUCTION

In an effort to improve auditors' success at preventing and detecting financial statement frauds (hereafter, fraud), the U.S. government passed the Sarbanes-Oxley Act of 2002 and created the Public Company Accounting Oversight Board (PCAOB). The PCAOB (2007) recently issued a report regarding problems in auditors' approaches to fraud detection. A key finding is that even though auditors are generally able to effectively diagnose

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high fraud risk, it appears that they often fail to link their fraud risk assessment to appropriate changes in their audit procedures. The PCAOB's finding is consistent with academic research that shows that auditors do not effectively change the design of their audit procedures in response to high fraud risk (Zimbelman 1997; Glover et al. 2003). Moreover, research has found that using a standard audit program makes auditors less likely to effectively change their audit procedures (Bedard 1989; Asare and Wright 2004). Using only standard audit procedures is problematic in a fraud setting because it allows a fraud perpetrator to conceal a fraud from the audit plan (Nieschweitz et al. 2000; Wilks and Zimbelman 2004a). However, firms continue to utilize standard audit programs because they tend to be comprehensive and increase consensus among auditors (Ashton and Ashton 1995). This study explores whether audit policy can be used to induce auditors to link their fraud risk assessments to effective changes in their standard audit procedures. Specifically, we conduct an experiment to explore whether two interventions (i.e., strategic reasoning and brainstorming) help practicing auditors plan audit procedures that are recommended by fraud experts when they observe high fraud risk.[1]

SAS No. 99 (AICPA 2002), the current standard governing auditors' efforts at detecting fraud, requires auditors to engage in group brainstorming for the purpose of detecting fraud, but it does not explain what it is about brainstorming that will help auditors to improve their audits or which aspect of the fraud-detection process would benefit most from brainstorming. The fraud-detection process is comprised of several steps. First, auditors must be sensitive to fraud risk, assessing it to be higher when a fraud exists than when it does not. Next, auditors must budget and plan effective fraud-detection procedures that are linked to the fraud risk. Third, they must effectively collect and interpret the evidence from the procedures. Last, auditors must appropriately respond to their audit findings. Previous academic research on brainstorming (e.g., Carpenter 2007) explored the effects of brainstorming on the first step of this process, fraud risk assessment. We explore the effects of brainstorming on the next step, where auditors must plan effective audit procedures in response to high fraud risk. This is the step identified by academic research and the PCAOB as needing improvement.

There are many potential benefits from brainstorming. When the task is difficult to perform, as is the case with planning fraud-detection procedures, brainstorming could improve auditors' planning decisions by reducing their cognitive load (i.e., more heads are better than one). Brainstorming could also help auditors generate more, and more creative fraud-detection procedures. In our context, one way to generate more creative fraud-detection procedures is to reason strategically. Strategic reasoning in an audit context occurs when an auditor considers the following three questions: (1) What potential frauds may have occurred? (2) How could management conceal the potential frauds from the standard audit plan? (3) How could the audit plan be modified to detect the concealed frauds? While SAS No. 99 does not discuss strategic reasoning per se, it implies that brainstorming will help auditors achieve the benefits of strategic reasoning. For example, SAS No. 99 encourages auditors, when brainstorming, to think of tests that would be atypical and unpredictable from the client's point of view. Therefore, we expect brainstorming to lead auditors to reason strategically, which will help them to link their heightened fraud risk assessments to more effective audit procedures.

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[1] Note that we examine the link between auditors' fraud risk assessments and audit procedures without manipulating fraud risk at varying levels. We hold fraud risk constant at a high level to see if auditors are able to design audit procedures to detect the specific fraud they suspect.

Exploring the effects of both brainstorming and strategic reasoning on auditors' planning of fraud-detection procedures under high fraud risk provides an important opportunity to address the PCAOB's concerns and has implications for audit practice. For example, if strategic reasoning helps individual auditors to plan more effective audit procedures under high fraud risk, auditors could be encouraged to engage in this process even while working alone. Additionally, if brainstorming also helps auditors make more effective planning decisions, we gain a better understanding of one of the benefits of brainstorming. If auditors who brainstorm make more effective planning decisions when they are also instructed to engage in strategic reasoning, then the strategic-reasoning intervention can be required during brainstorming sessions. Because one objective of our research is to explore potential policies that may improve auditors' effectiveness at detecting fraud (Kachelmeier and King 2002), our design incorporates several features to maximize the generalizability of our findings. First, our participants are practicing audit managers from an international auditing firm. Second, our experimental task was designed by modifying an actual fraud case documented in an SEC Accounting and Auditing Enforcement Release (AAER). Third, we measure the effectiveness of our participants' audit plans by comparing our practicing auditors' planning decisions with three fraud experts' planning decisions for our specific case. Fourth, we provide our participants with a standard audit program so as to recognize the benefits of using such programs while examining methods to increase their effectiveness. These features allow us to provide useful insights for policymakers regarding the use of strategic reasoning and brainstorming in fraud detection. We also extend the academic literature on the effects of these interventions when planning audits to detect fraud.

Our results suggest that, even when using a standard audit program, individual auditors who are prompted to engage in strategic reasoning more effectively modify their standard audit procedures relative to individual auditors who are not prompted to engage in strategic reasoning. Thus, audit policymakers could encourage auditors to engage in strategic reasoning to offset the negative effects of using standard audit programs. Our results also show that for auditors who are not instructed to reason strategically, those who interact in brainstorming groups are more likely to effectively modify their standard audit procedures than are individual auditors working independently. When we investigate the effect of using both interventions simultaneously, we find that the combination of the two interventions does not provide significant additional benefit above that achieved by using just one of the interventions. That is, when auditors are explicitly instructed to reason strategically, adding more managers to the process in a brainstorming group does not result in better judgments. Thus, for the audit managers in our study, both strategic reasoning and brainstorming are helpful interventions, and either is sufficient to improve their judgments.

The next section reviews prior research and develops our predictions. In Section III we explain our methodology. Sections IV and V present our results and offer conclusions and limitations of our study.

II. PRIOR RESEARCH AND HYPOTHESES

Background and Prior Research

The PCAOB (2007, 5–6) stresses the importance of responding to fraud risks by changing the "nature, timing, and/or extent" of audit procedures. The *nature* of a planned audit procedure refers to either the type of procedure performed or characteristics of the sample selected, *timing* refers to whether the auditor collects evidence at interim or after year-end, and *extent* refers to the amount of evidence gathered. For example, assume an auditor decides to use confirmations to test the existence of accounts receivable. The auditor can change the nature of the test by using different forms of confirmations (e.g., negative versus positive) or by focusing the sample on specific customers (e.g., large versus small accounts). The auditor can change the extent of the test by choosing a different sample size.

Game theoretic audit models suggest that auditors' responses to increased fraud risk should include designing unpredictable procedures that will detect a fraud that is concealed from standard procedures (e.g., Fellingham and Newman 1985; Shibano 1990). Prior research suggests that auditors may have difficulty modifying the *nature* of their tests (see Wilks and Zimbelman 2004a). Thus, an effective audit strategy for detecting a cleverly designed fraud should include changes to the *nature* of audit procedures so that the auditee cannot easily predict the audit plan (see Nieschweitz et al. [2000] and Wilks and Zimbelman [2004a] for a review of this research). This position is predicated on the belief that, given sufficient opportunity, fraud perpetrators will conceal their acts so that discovery through using traditional audit procedures is difficult, if not impossible.

Standard Audit Procedures

Using a specific fraud case, Asare and Wright (2004) find that standard audit programs make auditors less likely to change the nature of their audit procedures. This is consistent with Pincus's (1989) finding that using a fraud checklist impaired auditors' ability to assess fraud risk. Asare and Wright (2004) offer several reasons for their findings. They explain that standard audit programs promote an action-oriented strategy, where the decision maker acts before thinking through the problem (Todd and Benbasat 1992), and can promote mechanistic processing and inflexibility (Cushing and Loebbecke 1986). They also note that a standard program may interfere with and inhibit their ability to think about alternative procedures (Heiman-Hoffman et al. 1995), and that an action-oriented strategy is likely to inhibit an auditor's ability to reason strategically (Wilks and Zimbelman 2004a). Despite these problems, most audit firms continue to use standard audit programs because they increase quality control by providing a comprehensive set of procedures, and are likely to increase consensus in auditors' judgments (e.g., Ashton and Ashton 1995). Our study provides evidence on whether it is possible to retain the positive aspects of using a standard audit program, while overcoming the problem that standard audit programs inhibit auditors from changing the nature of their audit procedures in a high-fraud-risk setting. We investigate whether strategic reasoning and brainstorming enable auditors to modify the nature of their audit plans when using a standard audit program. These interventions are designed to get auditors to think before they act and to think about the procedures from a different perspective. We expect these interventions to counteract the tendency to think mechanistically when using a standard audit program.

Strategic Reasoning

Auditors engage in strategic reasoning as they identify specific frauds and anticipate the auditee's response to their audit plan. Auditors who only consider their own incentives, but do not consider how an auditee may respond to their audit plan are not engaging in strategic reasoning (i.e., zero-order reasoning per Zimbelman and Waller [1999]). Zimbelman and Waller (1999) identify two potential levels of strategic reasoning: first-order and higher-order reasoning. Auditors who engage in first-order reasoning consider conditions that affect the auditee. For example, when the auditee has incentives to conceal information, the auditor modifies the audit plan to detect the concealment. However, under first-order reasoning the auditor does not consider whether the auditee has anticipated the auditor's changes to the audit plan. Higher-order strategic reasoning occurs when the auditor considers how the auditee could anticipate the auditor's behavior. Under such reasoning, because the auditor realizes that the auditee will be expecting the standard audit procedures and will have designed the fraud to conceal it from the standard procedures, the auditor will modify the procedures so as to detect these concealments. Thus, engaging in higher-order reasoning can help auditors anticipate a fraud that is concealed from standard procedures and can lead them to design procedures that are more likely to detect such a fraud.

Audit researchers (e.g., Bloomfield 1995; Zimbelman and Waller 1999) and those studying behavioral game theory (see Camerer 2003) have demonstrated that individuals find higher-order strategic reasoning to be cognitively challenging, and do not spontaneously engage in such reasoning. We argue that because strategic reasoning is challenging, providing structure for this task will help auditors to engage in deeper levels of strategic reasoning than they would without such an intervention. This expectation is based on prior findings that decision aids that provide structure for difficult problems improve effectiveness and efficiency in these tasks (see Abualsamh et al. 1990). Additionally, research shows that decomposing a difficult decision into separate components improves performance (see Armstrong et al. 1975). Jiambalvo and Waller (1984) offer two reasons that decomposing difficult decisions into component decisions may help in this setting. First, making component decisions requires less cognitive effort than making holistic ones. Second, breaking down a judgment into component judgments requires the decision maker to attend to information that is often overlooked when the decision is made holistically. Because our intervention provides structure by decomposing the strategic-reasoning process into component judgments, we propose the following hypothesis:

> **H1:** Individual auditors who are prompted to reason strategically will be more likely to modify the nature of their audit procedures in ways that are effective at detecting fraud than are individual auditors who are not prompted to reason strategically.

Brainstorming

SAS No. 99 requires auditors to brainstorm while planning the audit, presumably, with the hope that doing so will lead them to generate more effective audit procedures for detecting fraud. Research in psychology has shown mixed results regarding the advantages of engaging in brainstorming. Carpenter (2007) provides a review of this literature and relates it to brainstorming in the fraud setting. As noted by Carpenter (2007), the earliest brainstorming studies (e.g., Osborn 1957) find an increase in the number of ideas generated through the brainstorming process, and suggest that a brainstorming team that communicates with each other could improve their idea generation through "stimulation and synergy" of ideas. In addition, Carpenter (2007) discusses the process gains and losses that have been documented in the psychology literature, and points out that auditors are less likely to suffer from some of the typical pitfalls of the brainstorming process, such as free riding or social loafing, because of the professional nature and accountability inherent in public accounting. However, auditors could still be subject to other causes of "process loss," such as production blocking, where individuals forget ideas they are thinking about while waiting their turn to speak in the group (e.g., Diehl and Stroebe 1987). Another source of process loss is evaluation apprehension, which occurs when group members are intimidated about expressing an idea because they are concerned that others might not like it (e.g., Diehl and Stroebe 1987). This problem could be important in audit brainstorming groups because productivity loss due to evaluation apprehension has been found to be greater when an authority figure is present (e.g., Mullen et al. 1991) or when one engages in social comparison (e.g., Paulus and Dzindolet 1993), which is likely to apply to junior members of an audit team.

While early brainstorming studies in psychology measure the success of the brainstorming activity by the quantity of ideas generated, more recent studies stress the importance of generating creative, high-quality ideas (e.g., Sutton and Hargadon 1996). Rowatt et al. (1997) show that individuals believe it is more important to produce creative, original, and high-quality ideas than to generate a large number of ideas. Sutton and Hargadon (1996) suggest that the effectiveness of brainstorming sessions be judged by measures other than quantity, such as whether the items generated by the group meet the standards of the organization and will result in more competent work. In an audit setting, one way a successful brainstorming session could help auditors to arrive at better, more creative, ideas that lead them to do more competent fraud work is if the brainstorming session helps auditors anticipate how management could perpetrate and hide a fraud from standard audit procedures. Carpenter (2007) asks auditors to generate ideas about how a fraud could occur and be concealed, before making their fraud risk assessments. She finds that brainstorming leads auditors to generate more high-quality ideas. We extend this research by focusing on the high-fraud-risk setting and investigate whether brainstorming can be used to get auditors to plan audit procedures that not only increase the extent of audit work, but, importantly, also change the nature of their tests.

While we are not aware of any research that links the concepts of brainstorming and strategic reasoning, we believe that linking these concepts is helpful in predicting the effect of brainstorming in this task. SAS No. 99 does not use the phrase "strategic reasoning," but implies that one reason brainstorming will help auditors detect fraud is that it is expected to help them to think in ways that are similar to the strategic-reasoning process. For example, SAS No. 99 directs auditors to engage in a brainstorming session and "discuss the potential for material misstatement due to fraud." The standard continues by saying that the session should include:

> an exchange of ideas or "brainstorming" among audit team members ... about *how* and *where* they believe the entity's financial statements might be susceptible to material misstatement due to fraud (and) how management could perpetrate and *conceal* fraudulent financial reporting. (AU 316.14, emphasis added)

and:

> a consideration of the known external and internal factors affecting the entity that might (a) create incentives/pressures for management and others to commit fraud, (b) provide the opportunity for fraud to be perpetrated, and (c) indicate a culture or environment that enables management to rationalize committing fraud. (AU 316.15)

In the first two columns of Table 1, we compare the SAS's instructions for brainstorming with the different levels of strategic reasoning described by Zimbelman and Waller (1999). Note how similar SAS No. 99's instructions are to first-order and higher-order strategic reasoning. Given this similarity, we expect audit managers in brainstorming groups to bring their knowledge of SAS No. 99 to the task. Generally, we expect brainstorming to help auditors develop more high-quality, creative ideas. We expect auditors' knowledge of SAS No. 99 to focus those additional creative ideas around how to design procedures to detect a fraud that was concealed by management (i.e., consistent with strategic reasoning).

We expect that interacting in brainstorming groups is helpful to auditors when performing a cognitively demanding task. Previous research has demonstrated that planning effective fraud-detection procedures is a more difficult task for auditors than is fraud risk assessment (*cf.*, Zimbelman 1997; Knapp and Knapp 2001). In addition, although audit

TABLE 1
Correspondence of Strategic Reasoning, SAS No. 99, and Experimental Instructions

Definition of Strategic Reasoning in Audit Context (Zimbelman and Waller 1999)	SAS No. 99 Directions for Brainstorming (AU 316.14)	Our Manipulations of Non-Strategic and Strategic Reasoning
Zero-Order SR: Auditor considers conditions that affect auditor, but not auditee. For example, auditors consider only their own incentives, such as audit fees, sampling costs, and penalties.		Non-Strategic Reasoning Condition: Below is a list of the audit procedures that the partner wants you to consider using this year. Please review these procedures. (Participants were then shown a list of standard audit procedures for Accounts Receivable and asked the following question): What other audit procedures (besides the 12 procedures listed above) do you think would be effective to perform?
First-Order SR: Auditor considers conditions that affect the auditee. For example, when the auditee has an incentive to commit fraud, the auditor designs a plan to detect concealment.	Auditors should "discuss the potential for material misstatement due to fraud" and exchange ideas ..."about *how* and *where* they believe the entity's financial statements might be susceptible to material misstatement due to fraud" (AU 316.14, emphasis added)	Strategic Reasoning Condition (Steps 1–5): 1. Given your understanding of Oltrak, list one or two most likely methods that Oltrak management may be using to commit fraud in accounts receivable. 2. Below is a list of the audit procedures that the partner wants you to consider using this year. Indicate which five of the following audit procedures would be best able to detect the type(s) of fraud you identified in part 1 above by clicking in the box to the left of the procedure. 3. Assume management is able to anticipate your intended audit procedures, how could they conceal the type(s) of fraud you identified in part 1 from the audit procedures you selected in part 2? 4. What other audit procedures besides the 12 procedures listed previously would you perform to help you determine whether the fraud(s) you identified in part 1 were actually present in Oltrak?
Higher-Order SR: Auditor also considers how management might anticipate the auditor's behavior, and designs nonstandard audit procedures.	"... how management could perpetrate and *conceal* fraudulent financial reporting" (AU 316.14)	

managers can effectively detect fraud risk, prior research has shown that the linkage from risk assessment to the audit plan is often tenuous (Bedard 1989; Bedard et al. 1999). Also, as mentioned earlier, the PCAOB's inspections found that linking high fraud risk to effective changes in audit procedures continues to be a challenge for auditors (PCAOB 2007). Because planning fraud-detection procedures is a difficult task for auditors to perform individually, we predict that interacting in brainstorming groups will be beneficial to auditors in that the process gains from the brainstorming session will outweigh any process losses.

One process gain that we expect is that brainstorming will help stimulate ideas and that synergies will result from the audit managers discussing their audit plans with each other (Osborn 1957). As mentioned earlier, we also expect brainstorming to help auditors generate more creative audit procedures to detect fraud (Sutton and Hargadon 1996). Indeed, in an analytical procedures task, Bedard et al. (1998) find that groups of auditors of a similar level of experience (i.e., audit seniors) are able to generate more high-quality ideas than are individuals. A potential process loss that could occur from audit managers participating in a brainstorming session is that they could be subject to some degree of production blocking, where they forget an idea while waiting to speak (e.g., Diehl and Stroebe 1987). However, this loss is likely to be mitigated in practice (and in our study) because auditors are able to jot down ideas so they will not forget them. Also, we do not believe the typical process loss of being intimidated by authority figures will come into play in our task because all of the participants are audit managers (e.g., Mullen et al. 1991). Thus, in this cognitively demanding task, the potential benefits of sharing ideas seem greater than any potential process losses.[2] As such, H2 predicts that brainstorming will increase auditors' ability to effectively change the nature of their audit procedures in comparison with those who do not engage in brainstorming:

H2: Auditors who engage in brainstorming will more effectively modify the nature of their audit procedures for detecting fraud than will auditors who do not engage in brainstorming.

In addition to separately examining the effects of these two interventions, we also examine their combined effect by instructing some audit managers to reason strategically in brainstorming groups. It is not obvious *ex ante* whether the combined effect of the two interventions will be more beneficial than each one utilized alone. Because we believe that the brainstorming intervention will lead auditors to generate more high-quality, creative fraud-detection procedures that are likely to be focused around detecting a concealed fraud, the brainstorming intervention's effect could be similar to that of the strategic-reasoning intervention. Thus, the combination of the two interventions may not have much benefit above either intervention alone. If this is the case, H3a will hold:

H3a: Combining the brainstorming and the strategic-reasoning intervention will not have an incremental benefit over each intervention used alone (i.e., the combined effect will not be greater than the separate effects found in H1 and H2).

Alternatively, it is possible that compared to individual auditors who are instructed to reason strategically, brainstorming could have other benefits besides helping auditors to reason strategically. As mentioned earlier, brainstorming can stimulate auditors' idea generation and help them realize synergies of working together. A brainstorming group might be able to generate additional creative ideas on how to detect fraud that are unrelated to strategic reasoning. Also, even if brainstorming naturally leads auditors to reason strategically, if the task is difficult for the audit mangers to perform individually, brainstorming could increase their cognitive capacity (i.e., two heads are better than one) such that they benefit from reasoning strategically in groups rather than as individuals. Thus, the combination of the two interventions could be more beneficial than either used alone. If so, H3b will hold:

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[2] Note that we do not measure process gains and losses directly. Bedard et al. (1998) discuss that the only way to get direct evidence on process gains and losses is to conduct verbal protocol analysis.

> **H3b:** The combination of the brainstorming and the strategic-reasoning interventions will be more beneficial than either intervention used alone (i.e., the combined effect will be greater than the separate effects found in H1 and H2).

Regardless of whether our evidence is consistent with H3a or H3b, our prediction is that H1, H2, and H3 taken together will result in a nonsymmetric ordinal interaction. The pattern of this interaction differs between H3a and H3b. Panel A of Figure 1 illustrates the pattern predicted under H1, H2, and H3a, and Panel B illustrates the pattern predicted under H1, H2, and H3b. While both H3a and H3b predict that the solid line will be upward sloping and steeper than the dotted line, it is an empirical question whether Cell D will be significantly higher than Cells B and C. That is, H3a predicts that the combined effect of the interventions (Cell D) will not be significantly different from either the Strategic Reasoning (Cell B) or the Brainstorming intervention (Cell C) used alone (see Panel A of Figure 1), whereas H3b predicts that the combined effect of the interventions (Cell D) will be more beneficial than either intervention (Cell D > Cells B and C; see Panel B of Figure 1).

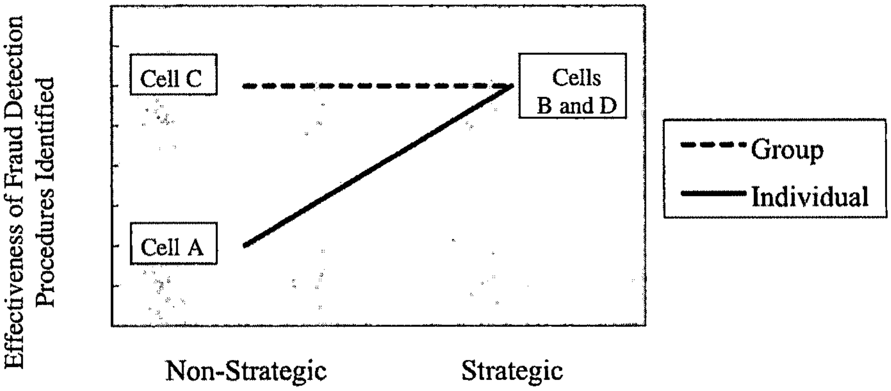
III. RESEARCH METHOD

Overall Design

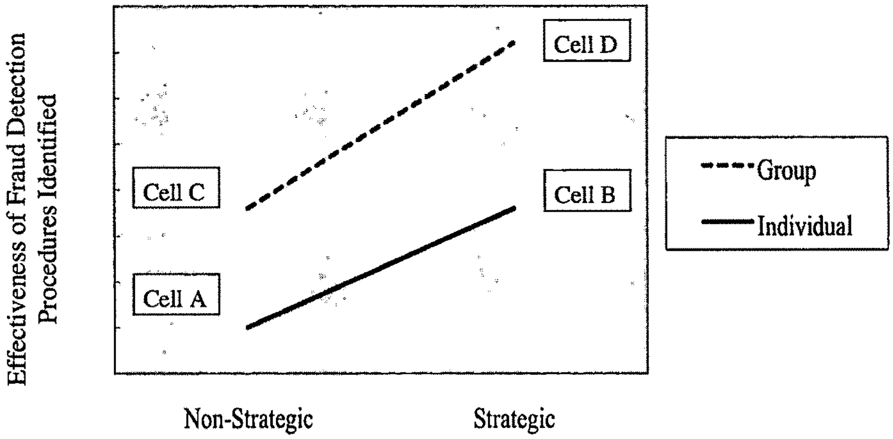
Our participants were 91 practicing audit managers from a large international audit firm. We recognize that, in practice, brainstorming groups will be comprised of individuals with varying levels of experience. However, to achieve experimental control, we hold the level of experience constant between conditions for a purpose similar to that in Libby and Trotman's (1993) study. That is, even though, in practice, audit workpaper reviewers are always more senior to audit workpaper preparers, Libby and Trotman (1993) use preparers and reviewers with the same level of experience in order to isolate the effect of the role of the auditor without confounding that effect with differing experience. Similarly, we hold the level of experience constant at the manager level to allow us to determine the effect of each intervention without confounding this effect with other effects that could vary simultaneously, such as experience level, power, or influence. Importantly, our goal is not to test whether one intervention will outperform another in audit practice (i.e., we are not conducting a "horse race" between strategic reasoning and brainstorming). Because the relative effectiveness of each intervention depends on the parameters chosen in the study, an experiment is not well suited to address this sort of question (see Libby et al. 2002, 796). Rather, our goal in examining brainstorming is to determine whether adding more auditors to the decision process helps in designing more effective audit procedures in response to

FIGURE 1
Predicted Effects of Strategic Reasoning and Brainstorming on the Nature of Audit Plans

Panel A: Illustration of H1, H2, and H3a



Panel B: Illustration of H1, H2, and H3b



Cell A: Individual audit managers with no intervention.
Cell B: Individual audit managers who were required to complete strategic reasoning exercise.
Cell C: Audit managers involved in group brainstorming sessions.
Cell D: Audit managers involved in group brainstorming sessions who were required to complete the strategic reasoning exercise.

H1: Cell B > Cell A
H2: Cell C > Cell A
H3a: Cell A < Cells B, C, and D
H3b: Cell A < Cell B and C < Cell D

high fraud risk.[3] If we include auditors with various levels of expertise in our groups, then we would simultaneously vary both the number of auditors making the decision *and* the expertise of the auditors, so we could not answer this question.[4]

We collected our data at a firm training session using a 2 × 2 between-participants experimental design where we manipulate the presence or absence of two interventions: Strategic Reasoning (Strategic versus Non-Strategic) and Brainstorming in groups (Individual versus Group). We randomly assigned participants to different rooms and all participants in a given room completed the same version of the experiment. In each condition, our participants' experience ranges from a mean of 4.5 to 6.4 years of audit experience, and there is no significant difference in experience across conditions.[5]

The experiment involves five phases that are administered by computer software. First, participants read about a hypothetical audit client. Second, each participant provides a fraud risk assessment. Third, the interventions are administered. For example, participants in the Strategic condition complete an exercise requiring them to engage in strategic reasoning. Similarly, at this point, those in the Group condition are assigned to groups of three and are instructed to brainstorm together. Fourth, all participants complete an audit-planning task that involves budgeting hours and recommending modifications to the standard audit procedures. Last, participants complete a post-experimental questionnaire individually. Important details of these five phases are described below.

The instrument includes a description of an actual fraud and is based on an SEC AAER. The description does not identify the fraud to the participants, and some details from the AAER were changed or omitted to disguise the actual company. The instrument presents background information that describes the auditee (Oltrak) and its industry, management, and business strategy. Importantly, all treatment groups are given a "fraud focus" in the background information. Specifically, the first two paragraphs of the instrument repeatedly tell all participants that the study involves fraud risk assessments and audit planning. For example, the first two sentences read: "You have been selected to participate in this study of fraud risk assessments. This study is designed to enhance our understanding of auditors' planning decisions related to financial statement fraud." Three more sentences in these paragraphs mention the requirement for participants to engage in audit-planning tasks related to fraud. Doing this is important to ensure that our strategic-reasoning manipulation does not focus auditors more on fraud in the strategic-reasoning condition than in the non-strategic-reasoning condition. In addition, the instrument provides financial information and includes results from preliminary analytical procedures performed at interim by an audit senior. Finally, we present all participants with ten fraud risk factors from SAS No. 99 that are present at Oltrak in order to suggest that the auditee has high fraud risk. After viewing this information, all participants assess fraud risk on a ten-point scale.[6]

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[3] It is not obvious how our brainstorming group would compare to a real-world, hierarchical team. In some ways, holding expertise constant at the manager level probably overstates the brainstorming group's effectiveness because it omits those with less experience who are likely to be less knowledgeable and who might suffer productivity loss due to evaluation apprehension (Mullen et al. 1991) or social comparison (e.g., Paulus and Dzindolet 1993), and would therefore be likely to contribute less to the group. In other ways, we might be understating the brainstorming group's effectiveness because we also omitted audit partners who likely possess more expertise than managers and who, during a real-world audit, are likely to have more influence (for better or worse) on the group's judgments. In any case, mixing expertise in a brainstorming group would not have allowed us to isolate the effects we were interested in examining.

[4] Note that Carpenter (2007) uses hierarchical groups of auditors in her study, but the goal of that study was different from ours. Carpenter wanted to see how the judgments of brainstorming groups used in audit practice compared to judgments made by individual auditors.

[5] We also ask the auditors how many engagements they had been on where there had been a material fraud. Seventy-five percent had never seen a fraud, 17 percent had seen one fraud, 7 percent had seen two frauds, and 1 percent had seen three frauds. Fraud experience did not differ across conditions.

Strategic-Reasoning Manipulation

After assessing fraud risk, managers in the Strategic condition complete an exercise that prompts them to reason strategically before responding to our dependent measures. This initial exercise is designed based on the understanding that strategic reasoning in auditing involves considering three broad questions: (1) how the auditee might commit one or more frauds, (2) how the auditee might conceal these frauds from the standard audit procedures, and (3) how the audit can be modified to detect the concealed frauds. To engage our participants in thinking about potential frauds, we gave those in the Strategic condition the following task:

1. SAS No. 99 requires auditors to discuss ways management may be committing fraud. Given your understanding of Oltrak, list one or two most likely methods that Oltrak management may be using to commit fraud in accounts receivable.[7]

Next, we present the auditors with a list of 12 audit procedures and ask them to perform the following two tasks to get them to think about how the fraud could be concealed from the standard procedures:

2. Below is a list of the audit procedures that the partner wants you to consider using this year. Indicate which five of the following audit procedures would be best able to detect the type(s) of fraud you identified in part 1 above by clicking in the box to the left of the procedure.
3. Assume management is able to anticipate your intended audit procedures, how could they conceal the type(s) of fraud you identified in part 1 from the audit procedures you selected in part 2?

The list of audit procedures referred to in these instructions is shown in Figure 2 and was developed by reference to auditing textbooks and through our pilot testing.

Finally, the following question is used to get this group of auditors to think about how they could modify the audit plan to detect a concealed fraud:

4. What other audit procedures besides the 12 procedures listed previously would you perform to help you determine whether the fraud(s) you identified in part 1 were actually present in Oltrak?

Note that we do *not* use responses to this initial exercise as dependent measures. Instead, this exercise is the treatment condition that structures the auditors' thinking so that they reason strategically when performing the audit-planning task that comes next. Auditors in both the Strategic and the Non-Strategic conditions perform the same audit-planning task

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[6] All participants assess fraud risk as individuals. The assessments are high in all conditions, and do not differ across conditions (see the "Results" section for details). Although we expect participants to rate fraud risk as being relatively high, measuring their fraud risk assessments is not the primary goal of our study. The main point of our study is to see whether, given high-fraud-risk, the strategic reasoning and brainstorming interventions help auditors to modify the nature of their audit procedures in ways that will be effective at detecting fraud.

[7] The Strategic Reasoning treatment condition explicitly mentions fraud in the manipulation, whereas the Non-Strategic Reasoning manipulation does not. While this could focus auditors more on fraud detection in the Strategic Reasoning condition, the fact that both groups receive the same background information that mentions fraud repeatedly and were told that ten fraud risk factors are present at this company should have led both groups to be focused on fraud. Further, the fact that both groups have similar high-fraud-risk assessments is evidence that both groups understand that they are planning an audit in a high-fraud-risk situation.

FIGURE 2
List of Standard Audit Procedures for Accounts Receivable

Audit Procedures
1. Perform analytical procedures on the allowance, bad debts, and aging of receivables.
2. Review the AR ledger, cash receipts journal, and sales journal for large or unusual items.
3. Select A/R balances to confirm and send positive and negative confirmation requests.
4. Examine evidence of subsequent cash collection from the customer for the following: • any positive confirmations not returned, • negative confirmations returned with significant exceptions, and • other account balances deemed appropriate.
5. For positive confirmations not returned and for negative confirmations returned with significant exceptions, examine supporting documentation such as billing and shipping documents.
6. Review the sales returns after year-end to determine the effect on the AR balance.
7. Test cutoff of sales, sales returns, and cash receipts at year-end.
8. Review the reconciliation of the subledger to the GL and investigate unusual items.
9. Test existence of sales by tracing details from the sales journal to supporting documents.
10. Ensure proper treatment of all related party sales and AR.
11. Perform Computer Assisted Audit Techniques (CAATs).
12. Conduct interviews of client personnel.

described later in this section and their responses from the audit-planning task are our dependent measures.

Participants who are not prompted to engage in strategic reasoning (i.e., the Non-Strategic condition) are given a different initial exercise after they assess fraud risk, and are told:

1. Below is a list of the audit procedures that the partner wants you to consider using this year. Please review these procedures.

Participants are then presented with the same set of 12 audit procedures as those in the Strategic condition (see Figure 2) and are asked the following question:

2. What other audit procedures (besides the 12 procedures listed above) do you think would be effective to perform?

Again, responses to this initial exercise are not used as our dependent measure. Rather, this is our way of getting auditors in the Non-Strategic condition to think about the standard audit procedures they would normally use before they adapted them to perform the audit-planning task in our context.

As mentioned earlier, Table 1 shows how similar SAS No. 99's brainstorming instructions are to first-order and higher-order strategic reasoning. The table also illustrates how our Non-Strategic manipulation corresponds to Zimbelman and Waller's (1999) definition of zero-order Strategic Reasoning. The third column of Table 1 shows how Steps 1 and 2 of our Strategic experimental manipulation are designed to get auditors to engage in first-order strategic reasoning, and how Steps 3 and 4 of our experimental manipulation require the auditors to engage in higher-order strategic reasoning.

Brainstorming Manipulation

Some participants complete the initial exercise and audit-planning task as individuals and others do so in three-person brainstorming groups. Participants in the brainstorming groups begin and end the experiment working individually but perform the audit-planning task in groups of three. The three-person groups perform the same audit-planning task that the individuals perform but are given instructions to perform the task together. After reading the background information about the case and making their fraud risk assessment, the brainstorming groups receive the following instructions, which the individuals do not receive:

> In the following screens and for nearly all responses during the remainder of this exercise, you should brainstorm as a group to generate your responses and one group member will be responsible for recording all responses (i.e., the recorder). Some of the questions that follow will be open-ended. For these questions, each member of the group should offer all ideas that come to mind and the recorder should record all responses given without editing. For those questions that are not open-ended, the group should reach a consensus before the recorder enters the group's response. The program will notify you when you are to return to making individual responses.

Participants then select one group member to be the "recorder." Once the group completes the audit-planning task, the program instructs them to complete a post-experimental questionnaire individually.

Dependent Measures

In the audit-planning task, all participants receive last year's standard audit program which lists the 12 procedures in Figure 2, and provides the hours used in the prior year. We then allow the participants to modify the nature of the procedures and to assign budgeted hours. We use their modifications as our dependent measures. Because prior research has shown that auditors tend to use the heuristic of defaulting to last year's audit plan (Bedard 1989), it is important to provide participants with last year's audit procedures and hours to determine whether our interventions can overcome this heuristic.

Case Details

In the section of the instrument that discusses analytical procedures performed at interim, we provide information that suggests how a fraud could have been perpetrated. The goal is not only to suggest high fraud risk, but also to give all participants specific information regarding how management could have committed a fraud. Management told the auditors that the increase in accounts receivable was due to a new marketing strategy instituted in mid-November. Oltrak reallocated marketing responsibilities, turning all sales of analog products over to its distributors and focused its efforts on a newer line of digital products. To implement this plan, distributors were given significant incentives to buy analog products in mid-November and December. The case is suggestive of a revenue fraud perpetrated by channel stuffing obsolete inventory through the distributor sales channel.[8]

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[8] We focus our case on revenue recognition since archival research suggests that revenue fraud is the most common fraud leading to restatement (e.g., Beasley et al. 1999). We adapt the Bausch and Lomb SEC AAER case of 1997 by changing the contact lens company to a distributor of analog and digital equipment, which is the setting used by Asare and Wright (2004). However, we do not use Asare and Wright's case in our study.

Measuring Audit Plan Effectiveness

To evaluate the effectiveness of our participants' audit-planning decisions, we use benchmark planning decisions from three fraud experts who reviewed the case and listed effective procedures for detecting the fraud. The three fraud experts have extensive experience as partners working in the forensics area at the national level of three different international public accounting firms. We purposely did not tell the experts what the fraud was in the case. Instead, we had them work through the case description the same way the experimental participants would in order to determine what they thought effective procedures would be. As mentioned earlier, we designed the case to be an obvious high-fraud-risk situation, so it was apparent to these experts that they were designing procedures that would be effective in detecting any fraud that might be present. Specifically, we asked them: "We are interested in obtaining your input as to the type(s) of audit/forensic procedures that an expert fraud auditor would recommend for the case described below." We then presented the case and asked the experts for their recommended audit procedures. The experts noted several changes to the nature of the standard procedures that could be used to detect the fraud. All of the experts correctly identified the nature of the fraud and proposed similar procedures to test for it.

Audit-Planning Task

Our experts' recommendations were obtained prior to collecting data from participants and were used to design our audit-planning task. Instruments used in some prior studies (e.g., Zimbelman 1997; Glover et al. 2003) simply allow participants to budget more hours to perform additional standard procedures in response to fraud risk. While these studies look at the overall mix of procedures as a measure of changes to the nature of audit plans, our instrument is designed to more powerfully detect changes to the nature of the standard audit procedures—especially those recommended by the experts. However, we do not present our participants with the experts' responses. Instead, the audit-planning task requires participants to provide details about their planned procedures such that each individual (or brainstorming group) is evaluated as to whether they independently generate the experts' answers. For example, when participants budget hours for confirming receivables, the audit-planning task requires them to specify which customers they choose to focus on. This is important because the experts believe the confirmations should focus more on the distributor accounts. Figure 3 shows the screen that opens up after a participant enters budgeted hours for confirming receivables (Procedure 3 in Figure 2). Additional screens open up depending on participants' responses. These screens capture our dependent measures and are based on the experts' recommendations.

The experts' responses include numerous procedures for detecting fraud. Our instrument incorporates the experts' procedures by including both quantitative and qualitative measures. We use the quantitative measures as dependent variables and the qualitative measures to assess our participants' objectives for the procedures.[9] We use dependent measures that are based on audit-planning decisions unanimously recommended by the experts. The decisions

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[9] These measures involve open-ended questions with significant variability in the responses. For example, we ask participants the following: "What would you emphasize in your examination of sales returns?" As can be expected from such a question, we have three categories of responses: (1) some clear responses that demonstrate that they understood the fraud because they plan to search for returned sales resulting from channel stuffing; (2) responses that involve only a few words such as "revenue recognition" or "terms of sales agreement," and (3) a large group of blank responses. Interpreting the second category of responses was often ambiguous. As such, we focus our hypothesis tests on the quantitative measures, and use the qualitative responses to gain insight into what participants were thinking.

FIGURE 3

Illustration of Detailed Planning Decision for Confirming Accounts Receivable

The table below shows confirmations sent last year:

Confirmation and Account Type	**Number/Selection Method**	**$ Coverage**	**% Coverage of A/R Balance**
Positive Confirmations: Accounts Serviced by Oltrak	25 largest balances	$4,487,000	11.8%
	10 randomly selected balances	368,000	1.0%
Positive Confirmations: Distributor Accounts	30 randomly selected balances	995,000	2.6%
Total Positive Confirmations	65 positive confirmations	$5,850,000	15.4%
Negative Confirmations: Accounts Serviced by Oltrak	100 randomly selected balances	$3,242,000	8.5%
Negative Confirmations: Distributor Accounts	100 randomly selected balances	3,310,000	8.7%
Total Negative Confirmations	200 negative confirmations	$6,552,000	17.2%
Total Confirmations	265 total confirmations	$12,402,000	32.6%

The table below shows the number of each type of account outstanding at year-end last year and this year:

Description	**Last Year**	**This Year**
Large balances serviced by Oltrak	48	54
Other, smaller balances, serviced by Oltrak	350	180
Distributor balances	595	785

Please use the table below to indicate the number of confirmations you desire to send this year:

Confirmation and Account Type	**Number/Selection Method**	**Approx. $ Coverage**	**Approx. % Coverage**
Positive Confirmations: Accounts Serviced by Oltrak	(n) largest balances	(computed by software)	(computed by software)
	(n) randomly selected		
Positive Confirmations: Distributor Accounts	(n) randomly selected		
Total Positive Confirmations	(n, sum from three cells above) positive confirmations		
Negative Confirmations: Smaller Accounts Serviced by Oltrak	(n) randomly selected		
Negative Confirmations: Distributor Accounts	(n) randomly selected		
Total Negative Confirmations	(n, sum of two cells above) negative confirmations		
Total Confirmations	(n, sum of total positives and total negatives) total confirmations		

center around four audit procedures: (1) accounts receivable confirmations; (2) subsequent cash receipts testing; (3) sales returns testing; and (4) other procedures. We use six dependent variables related to these procedures. Below, we discuss each variable and how it captures a change in the nature of the audit procedures.[10]

Audit Procedures

Accounts Receivable Confirmations

Our experts recommend that it is far more effective to send positive rather than negative confirmations and, because the fraud is in the distributor accounts, the confirmations should focus on these accounts. Our dependent measures to test for these recommendations are (1) the number of positive confirmations to distributors and (2) the percentage of positive confirmations to distributors of total confirmations. Since the fraud involves sales and accounts receivable within a subset of customers (i.e., distributors), we test whether our groups vary the nature of their confirmation evidence by focusing their confirmations on distributors. Thus, auditors who emphasize positive confirmations to distributors, as opposed to just sending more confirmations overall, effectively vary the nature of their confirmation evidence to detect the suspected fraud. We use two measures to capture these recommendations because the number of positive confirmations to distributors could increase if there is an increase in the extent of testing (e.g., sending more confirmations overall without focusing on distributor accounts). Also, the percentage of positive confirmations to distributors of total confirmations could increase for reasons that are not part of the experts' recommendations (e.g., a decrease in other confirmations rather than an increase in positive confirmations to distributors). Thus, these two measures test whether auditors change the nature of their procedures as the experts recommend.

Subsequent Cash Receipts and Sales Returns

The experts recommend that the auditor extends the periods for examining subsequent cash receipts and sales returns after year-end. For each of these items, we inform participants that last year the period examined was from January 1st to February 15th and ask them for the period that they want to examine this year. As a result, we have two separate dependent measures that involve the number of days past year-end: one for subsequent cash receipts and one for sales returns. Given the definition of nature versus extent described previously, we argue that a way to change the extent of testing without changing the nature of the test is to examine the same dates as last year, but to change the number of items examined. On the other hand, if the auditor is concerned that distributors will be slower to pay for "channel stuffed" sales and/or return the sales after a relatively long time period because of a side agreement, the auditor should change the *window* for examining both cash receipts and sales returns. While extending the window might also lead to extending the number of items tested, it is primarily a change in the nature of the test because it is essentially a different test. Specifically, the auditor is testing whether the cash is ever received or whether the sale is eventually returned, even during the longer window.

Our experts also recommend that the audit plan should focus the review of subsequent cash receipts on the distributor account balances as opposed to the other account balances. We ask participants, "What percentage of the A/R balances from distributors do you want to examine subsequent cash receipts for this year?" We also ask for the corresponding percentage for the other accounts. We use the difference in these percentages as our dependent measure. This variable captures the type of customer (i.e., distributor or other) participants plan to focus on in their subsequent cash receipts tests.

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[10] We recognize that each procedure involves an increase in the amount of work performed and, as such, may secondarily be considered to be a measure of the extent of our participants' audit plans.

Other Procedures

Our experts suggest that participants should use other procedures, such as interviews of client personnel and Computer Assisted Audit Techniques (CAATs), to determine unusual relationships and items such as fictitious addresses on confirmations. Our dependent measures for these two recommendations are the number of hours budgeted to perform the interviews or the CAATs. Note that last year zero hours were budgeted for each of these procedures, so if auditors budget any hours for these procedures, they are changing the nature of their audit plan. Of course, they are also changing the extent of their testing by budgeting more hours.[11] Additionally, our experiment explores other changes to the nature of the audit plan due to the way these procedures are to be implemented. For example, auditors who budget more hours for interviewing could use the hours to either: (1) interview different types of people or (2) ask more and different questions to a standard group of people. Similarly, we expect the increase in the hours spent on CAATs to be used to test for the hypothesized fraud. To explore our expectation that participants would use CAATs and interviews to search for the fraud, our instrument asks participants to describe what they would "be investigating with CAATs" and who they would interview, what they would ask, and what they would look for in their interviews. Typical responses for the CAATs inquiry include such things as: "large amounts close to year-end," "patterns of returns from distributors," and "unusual" or "suspect transactions." Regarding the use of interviews, participants indicate they would investigate such things as whether lower-level clerks and shipping personnel were aware of unusual sales terms or shipments to odd locations. Many also indicate they would ask about side-agreements or terms related to the new marketing program. Overall, it is clear that participants intend to use these procedures to modify the nature of the audit plan to investigate the specific fraud that is implied by the case materials.

Unique Design Features

Overall, to enable us to determine whether strategic reasoning and brainstorming help auditors change the nature of their audit procedures in response to fraud risk, our design utilizes many features not used in prior research. For example, prior studies (e.g., Zimbelman 1997; Wilks and Zimbelman 2004b) manipulate fraud risk by varying red-flag cues without giving information about the economic conditions affecting the fraud. As a result, fraud risk manipulations have been general in nature, which may explain why these studies conclude that auditors appear to respond to fraud risk by using standard procedures instead of procedures that are tailored to a specific fraud. One could argue that auditors who participated in these experiments might have changed the nature of their audit procedures if the fraud cases had been presented in a more specific context. Although there have been a few recent studies that use specific cases to examine fraud risk assessments (e.g., Knapp and Knapp 2001; Carpenter 2007), these studies do not explore decisions regarding audit procedures. Additionally, while previous studies examine only the number of *hours* auditors would budget to implement the standard procedures (e.g., Glover et al.

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[11] Zimbelman (1997) looks at the mix of budgeted hours for various procedures to search for changes to the nature of the audit plan. In this study, auditors who added any hours for these new procedures changed the nature of their audit plan, and those who budgeted more hours for either interviewing or CAATs chose a different mix of procedures from those who budget fewer hours.

2003, Zimbelman 1997), our instrument uses a specific fraud case and allows auditors to propose both the number of hours and to *tailor* their audit procedures in response to the fraud risk, explaining how they would use any additional hours budgeted. Our approach allows us to extend the literature to determine whether some prior findings regarding the nature of audit plans are due to the specific experimental design employed and whether engaging in strategic reasoning and brainstorming can positively influence the nature of audit plans in response to fraud risk.

IV. RESULTS

Before presenting data regarding our hypotheses, we test whether auditors perceive the case to have high fraud risk, as intended. In all treatment conditions, auditors do perceive Oltrak to be a high-fraud-risk case with the mean fraud risk in the four treatment conditions ranging from 7.9 to 8.2 on a ten-point scale. As expected, there is no significant difference in fraud risk across treatment conditions.[12]

Summary of Results for Audit Procedures Suggested by Experts

Recall that we use specific procedures suggested by our experts as dependent variables to determine whether the auditors appropriately change the nature of their audit procedures to detect fraud. Table 2 presents the results for all four treatment conditions for each of these procedures, and shows the results of tests of hypotheses for each procedure. We use contrast weighting (Buckless and Ravenscroft 1990) instead of using a conventional ANOVA because the conventional ANOVA tests for a disordinal, cross-over interaction, not the nonsymmetric ordinal interaction illustrated in both Panels A and B of Figure 1.[13] For all of the procedures, the overall pattern of results follows that illustrated in Figure 1, Panel A. That is, our results are consistent with the contrast where Cell A < Cells B, C, and D, where Cells B, C, and D were not different from each other, which is consistent with H1, H2, and H3a. Together, these hypotheses predict the following: (1) audit managers in the Individual/Non-Strategic condition (Cell A) will be least effective at modifying the nature of the standard audit procedures, (2) both the strategic-reasoning intervention (Cell B) and the brainstorming intervention (Cell C) will be more effective than Cell A, and (3) the combination of the two interventions (Cell D) would not provide additional benefit above each utilized alone.

Because H3a predicts that Cells B, C, and D are similar to each other, and greater than Cell A, we use contrast weights −3, 1, 1, 1 to test this pattern (Buckless and Ravenscroft 1990, 938). Because H3b predicts that Cell D is greater than Cells B and C, we use contrast weights −3, 0.5, 0.5, 2 to test the pattern illustrated in Panel B of Figure 1. In addition to testing whether the contrast itself is statistically significant, an important part of contrast testing is to examine the corresponding semi-omnibus F-test (a two-tailed test) to ascertain whether cells B, C, and D are different from each other. To be consistent with H3a, the semi-omnibus F-test should not be significantly different from zero, demonstrating that Cells

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[12] Fraud risk in the Non-Strategic Individual condition is assessed at 8.2; in the Strategic Individual condition it is 8.0; in the Non-Strategic Group condition it is 7.9, and in the Strategic Group condition it is 7.9. As expected, the difference across conditions is not statistically significant (Strategic versus Non-Strategic $F = 0.29$, $p = 0.59$; Brainstorming versus Individual $F = 0.64$, $p = .43$).

[13] As explained in Hoffman et al. (2003), contrast analysis is a refinement of the conventional ANOVA. Contrast analysis uses the same sum of squares as the conventional ANOVA, but in the conventional ANOVA three orthogonal contrasts are performed, one for each of the two main effects and one for a *specific* type of interaction (i.e., a disordinal, cross-over interaction with contrast weights 1, −1, −1, 1), which is *not* the type of interaction predicted in our study.

TABLE 2

Dependent Variables for Individual Auditors and Brainstorming Groups in the Strategic and Non-Strategic Reasoning Conditions

	Individual Auditors Mean (sd)		Brainstorming Groups Mean (sd)		Hypothesis Tests[a] t-statistic		
Dependent Variables	**Non-Strategic**	**Strategic**	**Non-Strategic**	**Strategic**	**H1**	**H2**	**H3a**
	Cell A, n = 17	Cell B, n = 18	Cell C, n = 29	Cell D, n = 27			
Procedure 1 (a): *Number* of Positive Confirmations to Distributors	38 (24)	118 (176)	109 (142)	82 (65)	1.87**	2.05**	2.05**
Procedure 1 (b): *Percentage* of Positive Confirmations to Distributors	16% (.08)	30% (.22)	38% (.22)	36% (.19)	2.56***	3.95***	3.64***
Procedure 2: Number of Days Past Year-End to Examine Subsequent Cash Receipts	58.5 (17.8)	71.4 (25.1)	68.6 (35.0)	75.6 (33.9)	1.74**	1.29*	1.63**
Procedure 3: Difference in Percentage of Subsequent Cash Receipts for A/R to Distributors less A/R to Non-Distributors	1.29 (10.4)	5.28 (9.2)	6.45 (7.8)	9.00 (14.5)	1.20	1.91**	1.91**
Procedure 4: Number of Days Past Year-End to Examine Sales Returns	59.1 (24.5)	74.4 (23.3)	75.9 (41.2)	78.7 (40.9)	1.90**	1.73**	1.79**
Procedure 5: Hours Budgeted for CAATs	5.5 (5.4)	9.4 (11.4)	17.0 (19.8)	15.0 (15.2)	1.29*	2.95***	2.05**
Procedure 6: Hours Budgeted to Interview	4.4 (3.4)	6.2 (4.5)	8.2 (10.2)	7.2 (5.6)	1.40*	1.89**	1.52*

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*, **, *** Indicates $p < .10$, $p < .05$, and $p < .01$, respectively.

[a] The hypothesis tests are one-tailed tests of whether Cell B > Cell A (H1), Cell C > Cell A (H2) and a Contrast of the Overall Pattern predicted in H3a and shown in Panel A of Figure 1. A semi-omnibus F-test was used to distinguish between H3a and H3b. The seven semi-omnibus F-tests for each of the dependent variables ranged from $F = .08$ ($p = .93$) to $F = 1.21$ ($p = .30$). This is consistent with H3a and not H3b. As such, we do not report results for H3b.

B, C, and D are not different from each other. To be consistent with H3b, the semi-omnibus F-test must be significant, indicating that Cell D is greater than Cells B and C. Our semi-omnibus F-tests for all procedures indicate that Cells B, C, and D are *not* different from each other (the F-tests range from $F = 0.08$ to $F = 1.21$ for the different procedures, and the significance levels range from $p = 0.93$ to $p = 0.30$). These semi-omnibus F-test results are consistent with H3a but do not support H3b. As such, we report the results of all analyses using contrast weights −3, 1, 1, 1. As shown in the last column of Table 2, the contrast predicted in H3a is significant at least at the $p < 0.05$ significance level for all procedures except for Procedure 6, which is significant at $p < 0.10$.[14]

In addition, the direction of the results is consistent with H1 for all procedures, indicating that the strategic-reasoning intervention is effective, but the statistical significance varies by procedure. Specifically, for three procedures (i.e., Procedures 1a and 1b, 2, and 4), the results are consistent with H1 at least at the $p = 0.05$ level, for two procedures (i.e., Procedures 5 and 6), results are consistent with H1 at the $p = 0.10$ level, and for one procedure (i.e., Procedure 3) results are not consistent with H1 at a conventional level ($p = 0.12$, not tabulated). Similarly, the direction of the results is consistent with H2 for all of the procedures, indicating that the brainstorming intervention is effective. For six procedures, the results are consistent with H2 at least at the $p = 0.05$ level and for one procedure (i.e., Procedure 2) results are consistent with H2 at the $p = 0.10$ level.[15] While the strength of the results differs somewhat for different variables, the results tell a consistent story. That is, brainstorming and strategic reasoning each lead to more effective audit plans under conditions of high fraud risk and the combination of these two interventions does not yield much extra improvement above either intervention used alone.[16] We next present the results for each dependent measure suggested by the experts.

Accounts Receivable Confirmations

The first procedure we examine is the auditor's choice of which type of, and how many, accounts receivable confirmations to send. As mentioned previously, the expert's responses suggest that an auditor who understands the fraud and changes the nature of the tests in response to the fraud should focus more on positive confirmations and concentrate more on the distributor accounts than on those serviced by Oltrak. We use both the Number of Positive Confirmations to Distributors (Procedure 1a) and Positive Confirmations to Distributors as a percentage of total confirmations sent (Procedure 1b) as dependent variables. The results are similar for both these dependent variables. For completeness, we report both measures in Table 2, but to avoid redundancy, we describe only the results for Procedure 1b. Consistent with H1, individual auditors who are prompted to reason strategically plan to send more positive confirmations to distributors as a percentage of total confirmations (mean = 30 percent; t = 2.56, one-tailed $p < 0.01$) than those who are not prompted to reason strategically (mean = 16 percent). Consistent with H2, auditors in brainstorming groups plan to send more positive confirmations to distributors as a percentage of total confirmations sent (mean = 38 percent; t = 3.95, one-tailed $p < 0.01$) than do those performing the task as individuals (mean = 16 percent). Consistent with H3a, the contrast is significant (t = 3.64, one-tailed $p < 0.01$) indicating that Cell A < Cells B, C, and D and Cells B, C, and D are not different from each other (semi-omnibus F = 0.81, p = .45, not tabulated).[17]

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[14] For completeness, we also ran conventional 2 × 2 ANOVA models for each of the dependent variables shown in Table 2 with Strategic Reasoning and Brainstorming as independent variables. The interaction terms in these models are not significant at conventional levels for any of the dependent variables shown in Table 2 except for Procedure 1(a) and 1(b) where the p-values are 0.039 and 0.045, respectively.

[15] Because all of our hypotheses are directional, we test them using a one-tailed test. Also, because we use multiple dependent variables to test one concept (i.e., changes to the nature of audit procedures), a MANOVA could be used. However, because we have large differences in variances across conditions (discussed later in this section), we deem it appropriate to adjust each individual test to account for the equal or unequal variance in that variable rather than to violate the MANOVA assumption that all variances are equal.

[16] Importantly, we are not suggesting that these two interventions are substitutes because there may be other benefits (not tested in our study) to using a particular intervention. Also, as mentioned earlier, an experiment is not an effective method for comparing the magnitude of two interventions. For example, we may not be able to explore all of the benefits of brainstorming because in order to maintain internal validity we made simplifications, such as holding the experience level of our groups constant. In addition, there may be other benefits to brainstorming besides modifications to the nature of audit procedures.

Because the analyses for all of the dependent variables are conducted similarly, we do not describe each of the statistical tests in detail in the text. Table 2 reports means, standard deviations, and results of hypothesis tests for each variable for each of the procedures. Therefore, to be more concise, we briefly summarize the intuition for each of the remaining variables below, but do not repeat the details reported in the table.

Subsequent Cash Receipts

Recall that in the prior year, auditors examined subsequent cash receipts for a 45-day period from January 1st to February 15th. In contrast, the experts believe the period should be extended to at least 90 days past year-end, which would enable the auditor to more fully determine whether cash was collected for receivables. Our results for Procedure 2 show that in all cells the mean is greater than 45 days, indicating that auditors generally know to extend their examination of subsequent cash receipts. Also, the strategic-reasoning intervention (H1) is significant at $p < 0.05$, the brainstorming intervention (H2) is significant at p = 0.10, and the contrast consistent with H3a is significant at p = 0.05.

If the auditor is more concerned about receivables from Distributors relative to the other accounts, then he or she should examine a larger percentage of the Distributor accounts receivable when performing the subsequent cash receipts testing. The percentages of accounts receivable to examine ranged from 16 percent to 27 percent, and are not included in Table 2. Table 2 reports the *difference* between the percentage of Distributor accounts receivable and the percentage of non-Distributor accounts receivable for which the auditor wants to examine subsequent cash receipts (Procedure 3). For Procedure 3, the results are directionally consistent with H1, but are not statistically significant at conventional levels. That is, the difference between the Distributor accounts and Non-Distributor accounts for which the auditor chooses to examine cash receipts in the Strategic reasoning condition (mean difference = 5.28 percent) is directionally greater than (t = 1.20, one-tailed p = 0.12) those in the Non-Strategic reasoning condition (mean difference = 1.29 percent). Consistent with H2, the brainstorming intervention is significant at $p < 0.05$, as is the contrast consistent with H3a.

Sales Returns

Our fourth dependent measure is the number of days past year-end for which the auditors plans to examine sales returns. Last year, the period examined was 45 days after year-end. Our experts believe this year's period should be extended to at least 90 days past year-end because there is a good chance that goods (especially those where there are side deals) could be returned well after year-end. For Procedure 4, we report the mean number of days past year-end that auditors plan to examine sales returns (note that in all cells, auditors know to extend the examination period to greater than the 45-day period). Results indicate that the strategic-reasoning intervention (H1) and the brainstorming intervention (H2) are both significant at $p < 0.05$, as is the contrast consistent with H3a.

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[17] The experts also suggest that auditors should inquire about side deals or special sales arrangements. At least 80 percent of the auditors mentioned that this was important, so it is a test that our auditors are aware of, but since almost all auditors in all conditions mention it, we do not include it in our results.

Other Procedures

Our experts suggest that it would be effective to perform Computer Assisted Audit Techniques (CAATs) and to conduct interviews of client personnel at various levels to identify the fraud. Because no hours were budgeted last year for either of these procedures, performing them this year not only extends the budgeted hours, but also changes the nature of procedures performed. Results for Procedure 5 report auditors' planned use of CAATs, and results for Procedure 6 report the number of hours auditors plan to interview client personnel. Results for Procedure 5 show that auditors in all treatment conditions plan to utilize CAATs. The results are consistent with H1 at the $p = 0.10$ level, indicating that the strategic-reasoning intervention increases the use of CAATS. The results are also consistent with H2, indicating that the brainstorming intervention increases the use of CAATs (significant at $p < 0.01$), and the contrast consistent with H3a is significant at $p < 0.05$. The results are similar for Procedure 6, hours planned to interview client personnel, with results consistent with H1 at $p < 0.10$, consistent with H2 at $p < 0.05$, and consistent with H3a at $p < 0.10$.

Additional Analysis

Although we do not predict differences in variances between treatments, it is apparent that there are large differences.[18] Bartlett's test for equal variances show that for four of the six variables, Brainstorming Groups have significantly more variance than Individuals (not tabulated). Furthermore, for four of the six variables, Strategic and Non-Strategic reasoning interventions do *not* result in different variances. Thus, while the brainstorming intervention improves auditors' planning decisions, it often significantly increases the variability in their decisions. Future research could explore the conditions in which brainstorming groups would be expected to increase the variance of audit plans to determine whether this is an effect that will systematically result from brainstorming.

V. SUMMARY AND CONCLUSIONS

Auditing standards require auditors to brainstorm, but neither auditing standards nor prior research indicate whether or how this process will improve auditors' judgments (*cf.*, Peecher et al. 2007). Prior research suggests that brainstorming can improve auditors' judgments by helping them generate more high-quality, creative ideas. One way to think more creatively in a fraud context is to anticipate how management could perpetrate and hide a fraud from standard audit procedures (i.e., engage in strategic reasoning). Because the wording in SAS No. 99 is similar to Zimbelman and Waller's (1999) definition of strategic reasoning, we anticipate that one benefit of brainstorming is that it could help auditors to reason strategically. Therefore, we conduct an experiment to examine the effects of both brainstorming and strategic reasoning (separately and together) to determine whether these interventions help auditors to modify the nature of their audit plans under high fraud risk.

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[18] We also did not have any hypotheses related to how many hours auditors would budget above the 96 hours budgeted last year. All the tests recommended by our experts take additional time to perform so they would result in additional budgeted hours. While it is possible to just add more hours to the budget by doing more standard procedures, our results show that this is not the case in our study—auditors did modify the nature of their tests as a result of the different treatment conditions.

Our study compares auditors' proposed modifications to standard procedures for a specific fraud case with and without each intervention, and finds that both interventions lead to more effective modifications to the standard procedures (as determined by fraud experts). We also find that, in our study, the combined effect of the interventions is not significantly different from either intervention alone.

Prior research shows that while auditors are generally good at assessing fraud risk, they do not effectively change their audit procedures in response to increased fraud risk. Carpenter (2007) focuses on the effects of brainstorming on auditors' fraud risk assessments, and our study extends this work by exploring brainstorming's effects on audit-planning decisions in a high-fraud-risk setting. Carpenter finds that brainstorming helps auditors identify more ways fraud could occur, and our study shows how this can be linked to designing more effective fraud-detection procedures. Moreover, in a recent field study, Brazel et al. (2007) finds real-world evidence consistent with our findings. That is, they find that designing effective fraud procedures seems to be a more cognitively demanding task than fraud risk assessment and suggests that a higher quality brainstorming session (e.g., one wherein auditors reason strategically) can help auditors design better procedures in response to fraud risk.

Previous research shows that when auditors use standard audit programs under high fraud risk they develop less effective audit plans than when they do not use standard audit programs (Asare and Wright 2004). Our study shows a potential way to offset this negative effect of a standard audit program. Presumably, firms continue to use standard audit programs because they provide benefits such as increased efficiency and/or quality control. We find that both strategic reasoning and brainstorming lead to more effective audit procedures, even while standard audit programs are used.

Although we find that both interventions cause auditors' planning decisions to be closer to experts' decisions, auditors still do not fully implement the experts' modifications. For example, the experts suggest focusing on positive confirmations. While both interventions lead auditors to use more positive confirmations, auditors also continue using a substantial number of negative confirmations, presumably because they were used extensively in the prior year. This could be due to a general reluctance to completely cut the use of procedures used previously (e.g., Bedard 1989; Cohen and Kida 1989). Furthermore, while our auditors do extend the subsequent cash receipts and sales returns periods, they do not extend the period to the 90 days suggested by the experts (the highest average number of days suggested in any condition is 78.7 days). This finding may be due to anchoring on the prior year, the level of our participants' experience, or the fact that our participants are not forensic specialists.

Limitations and Future Research

To maintain experimental control, our brainstorming participants are all managers. Future research could examine whether the strategic-reasoning intervention is also helpful to more junior auditors when they are working individually as well as when they are part of a brainstorming group. It is possible that for junior auditors, there might be more of an incremental benefit of combining strategic reasoning and brainstorming. It is also possible that partners could influence brainstorming decisions because of their increased knowledge or because of their influence (the latter of which would not necessarily improve judgments). Future research can explore how varying the *general* expertise in a brainstorming group affects the groups' decisions regarding planned audit procedures.

Our finding that the combined effect of the interventions is not significantly different from either intervention alone could be evidence that brainstorming in a fraud task prompts auditors to reason strategically, so there is no added benefit of audit managers reasoning strategically in brainstorming groups. However, because we did not measure the reasoning *processes* of our participants in a verbal protocol study (see e.g., Bedard et al. 1998), we cannot be sure of the cause of the benefit to auditors in our brainstorming groups. It is possible that auditors in brainstorming groups might not be engaging in strategic reasoning and that the benefits of brainstorming in our study are distinct from strategic reasoning, but of similar magnitude. If this were the case, it is possible that strategic reasoning and brainstorming provide unique benefits, but that receiving both interventions together increases the processing load such that the combined intervention has a negative offsetting effect on auditors' decisions. We cannot rule out this possibility as an alternative explanation for why our results are consistent with H3a and not H3b. Future research on the reasoning processes that groups engage in when planning for fraud could be used to further explore these possible explanations.

Future research could also be used to fine-tune both interventions. For example, it is possible that some brainstorming techniques might be more effective than others at eliciting ideas and developing fraud-detection procedures. Finally, current audit standards (e.g., SAS No. 99) require brainstorming but do not require strategic reasoning. In audit practice, the strategic-reasoning intervention could be utilized alongside brainstorming. Implementing this intervention may not carry much additional cost and it might be especially useful to auditors when they are working individually.

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Corporate Governance and Internal Control over Financial Reporting: A Comparison of Regulatory Regimes

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ABSTRACT: This study examines the association between corporate governance and disclosures of material weaknesses (MW) in internal control over financial reporting. We study this association using MW reported under Sarbanes-Oxley Sections 302 and 404, deriving data on audit committee financial expertise from automated parsing of member qualifications from their biographies. We find that a lower likelihood of disclosing Section 404 MW is associated with relatively more audit committee members having accounting and supervisory experience, as well as board strength. Further, the nature of MW varies with the type of experience. However, these associations are not detectable using Section 302 reports. We also find that MW disclosure is associated with designating a financial expert without accounting experience, or designating multiple financial experts. We conclude that board and audit committee characteristics are associated with internal control quality. However, this association is only observable under the more stringent requirements of Section 404.

Keywords: *internal controls; corporate governance; audit committee; financial expertise.*

Data Availability: *Data are publicly available from sources identified in the paper.*

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I. INTRODUCTION

This study investigates the association of audit committee and board characteristics with effectiveness of internal controls over financial reporting (ICFR). We measure this association using data on internal controls from two provisions of the Sarbanes-Oxley Act (Sections 302 and 404) that differ in the requirement that controls be tested by the company's management and external auditor. Our study fits within a large and diversified literature on the effectiveness of corporate governance mechanisms in addressing the agency problem arising from separation of corporate ownership from management. As noted by Sloan (2001) among others, the financial reporting system provides a means by which providers of capital can monitor managers. Managers' discretion over the measurement of earnings, along with the effects of earnings on management compensation through effects on stock prices, can combine to exacerbate the agency problem (e.g., Xie et al. 2003). If effective ICFR is imposed by owners, then the agency problem is mitigated. As representatives of owners, corporate boards of directors are responsible for supervising the financial reporting function to achieve this goal.

The expectation of regulators that corporate governance and financial reporting are strongly linked underlies several provisions of the Sarbanes-Oxley Act (SOX). These provisions apply higher standards for the structure and responsibilities of boards and audit committees with regard to financial reporting.[1] For example, with regard to governance structure, SOX Section 407 requires disclosure of audit committee members that the company chooses to designate as "financial experts." While the SEC initially proposed that only individuals with accounting experience could fulfill this role, final regulations implementing Section 407 allow two other categories of experience: "supervisors" of the financial reporting function (e.g., CEOs) and "users" of financial reports in a professional capacity (e.g., financial analysts and venture capitalists). With regard to governance responsibilities, SOX Sections 302 and 404 require companies to report information on the effectiveness of ICFR and related disclosures. Because strong ICFR restrict management's measurement discretion, disclosures made under these sections provide additional measures beyond financial reports that can be used to gauge the extent to which corporate governance has succeeded in reducing agency costs. Thus, SOX and its related regulations provide an increased emphasis on corporate governance as well as sources of data through which to measure the linkage of governance to internal control quality.

We investigate two research questions related to this linkage. First, we study whether internal control quality, measured as material weaknesses (MW) disclosure, is associated with governance characteristics; i.e., audit committee financial expertise, and board and audit committee structure and activity. Prior research on this issue presents mixed results.[2] For instance, Zhang et al. (2007) find that MW disclosure is negatively associated with audit committee financial expertise, but do not find an association with other audit committee characteristics. We build on that study by: (1) using a much larger sample enabled by automated collection of data on audit committee financial expertise; (2) covering a longer time period (the first two years of Section 404 implementation); (3) separately analyzing

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[1] Since SOX, external auditors report that the responsibilities and authority of the audit committee have increased, in terms of power over, and impact on, the financial reporting process (Cohen et al. 2009).

[2] While we investigate internal control quality as an indicator of financial reporting quality, some prior research directly investigates the association of corporate governance with characteristics of earnings (e.g., abnormal accruals or conservatism) or events consistent with poor quality of published financial reports (detected fraud or financial restatements) (e.g., Xie et al. 2003; Larcker et al. 2007; Dhaliwal et al. 2007; Carcello et al. 2008). Results of these studies also vary in detecting an association of governance with financial reporting quality.

MW by source (Section 302 or 404) and financial expertise by type (accounting, supervisory, and user); and (4) studying both qualifications of all audit committee members, and the board's decision to designate certain members as "Section 407 financial experts."

Second, we investigate whether the link between governance characteristics and internal control quality holds in both Sections 302 and 404 regulatory regimes. While both provisions require disclosures of internal control quality, they vary in strength. Section 404 goes beyond Section 302 in requiring both companies and their external auditors to test control effectiveness and in requiring an auditor opinion on control effectiveness. If mandated control testing and auditor involvement are required for process effectiveness, then less well-governed companies with ineffective ICFR may not detect and disclose MW under Section 302. If so, an association between corporate governance quality and internal control quality would not be evident under Section 302 reporting. This issue is of great importance, as the extension of Section 404 auditor testing to smaller U.S. public companies remains controversial, and regulators in other countries seek evidence on whether less stringent internal control regimes are sufficient for high-quality financial reporting.

We investigate these issues using a unique method of gathering data on corporate governance quality, specifically on audit committee financial expertise. Prior research addressing audit committee financial expertise is limited in obtaining data on smaller companies, which is needed to address our second research question. Those studies have either obtained data on audit committee qualifications from corporate governance databases (which focus on large public companies) or have hand-collected biographical information from proxy statements, resulting in small samples. Instead, we use an automated data extraction and parsing routine that builds a database of audit committee qualifications from background information available from AuditAnalytics. This method produces a sample of 5,480 firm-year observations with complete data on fiscal years ending between November 2004 to May 2006 (including 19,673 audit committee members), enabling us to address our second research question by studying the governance/MW association among smaller companies that are subject to Section 302 (but not Section 404) as well as larger companies subject to both regulatory regimes.[3]

Our findings reflect a clear difference in the association of corporate governance quality with MW disclosure between these regulatory regimes. We find that more accounting and supervisory financial expertise on the audit committee is associated with lower likelihood of MW disclosure under Section 404, but not under Section 302. For members with accounting qualifications, this association is evident regardless of whether the individuals are publicly designated as "Section 407 financial experts." However, among members with supervisory qualifications, we find a significant association only for individuals *not* publicly designated. Given the liability concerns expressed in comment letters to the SEC, some highly effective audit committee members with supervisory qualifications (e.g., CEOs or board chairs) may have been willing to serve, but not to be publicly identified as a "Section 407 financial expert." In supplemental analysis, we also find evidence that these two groups play different roles, consistent with their specialized expertise. Specifically, only accounting financial experts are associated with lower likelihood of disclosing MW related to account-specific control problems, while only supervisory financial experts are associated with lower likelihood of disclosing MW related to more management-oriented issues of personnel and information technology. Examining "user" financial experts (e.g., venture capitalists, financial analysts), we find that designating an audit committee member with "user" qualifications is associated with greater likelihood of Section 404 MW disclosure, relative to designating a member with accounting qualifications.[4] Results of this model also indicate that companies voluntarily designating multiple audit committee financial experts are more likely to disclose MW. In addition to audit committee financial expertise, our models show the expected negative association of Section 404 MW disclosure with higher quality corporate governance at the board level.

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[3] The original SEC guidelines in Regulation 12b-2 define accelerated filers as companies that have at least $75 million of common equity float, have previously filed at least one 10-K, are subject to the Exchange Act for at least 12 months, and do not qualify as a small business under SEC rules.

The above results are consistent across contemporaneous and lag specifications, are not sensitive to controlling for selection bias, and are robust to several alternative variable specifications. While they imply that corporate governance mechanisms are associated with better financial reporting quality as measured by Section 404 ICFR effectiveness, our models show no evidence of this association using Section 302 data.[5] Taken together, our findings suggest that in regulatory environments without requirements of mandatory testing and independent auditor attestation that are required under Section 404, corporate governance quality has no observable association with ICFR disclosure.

The remainder of this study is organized as follows. Section II presents the study's background, discusses prior research, and develops our research questions. Section III gives details on the study's method, and Section IV reports empirical results. Section V concludes the paper and presents limitations of our analyses.

II. DEVELOPMENT OF RESEARCH QUESTIONS

In this section, we discuss the study's regulatory context and review prior literature related to our research questions. We consider prior research on the association of corporate governance and internal control quality (our first research question), focusing especially on studies of audit committee financial expertise and internal control effectiveness. Next, we argue why this association might differ when internal control effectiveness is measured using MW disclosed under SOX Sections 302 and 404, supporting our second research question.

Corporate Governance and Financial Reporting Quality

To address our first research question, we consider characteristics of boards and audit committees commonly understood to be associated with good governance, such as composition, diligence, and independence. The corporate board of directors is responsible for monitoring management to protect the interests of owners.[6] While prior research has considered both board and audit committees, the most direct responsibility for financial reporting lies with the audit committee. As noted by Xie et al. (2003), the audit committee has the responsibility to oversee ICFR, communicating with management, internal and external auditors, and the board of directors to assure that appropriate controls are in place and reporting processes are effective. In order to discharge its responsibility to restrict managers' ability to use the financial measurement system to increase their own wealth at the expense of owners, the audit committee must possess the requisite understanding of financial reporting (SEC Rule 33-8177; 2003), including understanding of controls over that function.[7] Section 407 of SOX addresses this need through a disclosure requirement: at least one qualified individual must be "designated" (i.e., named in the 10-K), or the company must explain why no such individual is named.

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[4] Due to limitations on automated coding, we measure their association with internal control quality by studying companies' choices regarding whom to publicly designate as a "Section 407 financial expert."

[5] We find two results regarding our test variables that are common to both Section 302 and 404 regimes. First, audit committee size is not associated with MW disclosure under either regime, as also found by prior research (e.g., Krishnan 2005). Second, companies disclosing MW have significantly more audit committee meetings. This association is inconsistent with the notion of number of meetings as a diligence measure, and suggests that rather, audit committees with potential MW disclosures meet more frequently to discuss the problems with management and auditors prior to the public Section 302 or 404 report. Under both Section 302 and 404 regimes, we also find the expected associations of corporate complexity, financial health, and auditor change with MW disclosures.

[6] Relevant responsibilities of the board include member appointments, the designation of financial experts, ratifying audit committee decisions, and influencing management with respect to resource allocation into the financial reporting function.

In implementing Section 407, the Securities and Exchange Commission (SEC 2002) originally defined "financial expert" narrowly as "a person who has, *through education and experience* as a public accountant, auditor, principal financial officer, controller, or principal accounting officer, of a company that, at the time the person held such position, was required to file reports" (emphasis added). The SEC received over 200 comment letters, many claiming that this definition was too restrictive and would make it difficult to attract qualified individuals. Hence, the final regulation implementing Section 407 (SEC Rule 33-8177; 2003) defines "audit committee financial expert" as an individual with understanding of financial reporting and related internal controls, but not necessarily with direct experience in that function. This rule expands the set of allowed qualifications to include two additional categories: persons with experience supervising the financial function (e.g., CEOs, board chairs), and those with experience using financial information (e.g., venture capitalists, financial analysts). While "supervisory" and "user" expertise also relate to financial reporting, their experience is less directly tied to the preparation of financial reports.[8]

In line with their more relevant experience, prior research consistently finds that higher financial reporting quality is associated with more accounting financial experts on the audit committee (e.g., for characteristics of earnings see Dhaliwal et al. 2007; Carcello et al. 2008; Bédard et al. 2004; for internal control MW see Zhang et al. 2007; Krishnan 2005). However, few studies separately examine the other two categories. Of those, only Carcello et al. (2008) find that user expertise is associated with higher earnings quality, but neither Carcello et al. (2008) nor Dhaliwal et al. (2007) find an association with supervisory expertise.[9] Past studies of MW disclosure do not separately assess the supervisory and user categories, although Zhang et al. (2007) find a lower likelihood of MW associated with a combined measure of supervisory and user expertise. In sum, prior research strongly supports the value of including individuals with accounting-related experience on audit committees and boards of directors. However, the value of allowing financial experts with less direct financial reporting experience remains unclear. Further, very few studies have been performed on post-SOX data. Due to the importance of this issue, regulatory change and variance in prior findings, further research is called for.

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[7] For example, more knowledgeable audit committee members might have urged management to get an early start on ICFR documentation and testing under SOX 302/404, which would have reduced the likelihood of disclosing a MW at the balance sheet date.

[8] The originally proposed rule would have further required companies to disclose the number and names of all accounting financial experts. Many comment letters raised concerns that identifying individuals as financial experts would carry a higher liability, and thus it would be harder to find qualified individuals for the task. In reaction, the final rule requires companies to designate and disclose the name of only one financial expert, or explain why no one is so designated.

[9] Other studies either combine two of the expertise categories or use more narrow definitions of qualifications within categories, and most use pre-SOX data. For example, Abbott et al. (2004) use the broad definition of the Blue Ribbon Committee on Improving the Effectiveness of Corporate Audit Committees (BRC 1999) in a study of restatements during the 1990s, finding that companies with at least one financial expert have lower restatement likelihood. Bédard et al. (2004) use a definition of financial expertise more narrow than the BRC's (i.e., excluding CEOs), and find that this variable is negatively associated with earnings management. Farber (2006), using the BRC definition, finds mixed evidence of association between audit committee financial expertise and fraud in the pre-SOX period. Krishnan and Visvanathan (2008) find that a combined category of supervisor and user experts is not associated with more conservative financial reporting during 2000–2002. Xie et al. (2003) find evidence of association for both supervisor and user categories, but only use a subset of the qualifications listed in the SEC regulations: outside corporate directors and outside members from investment banks.

In addressing this question, we extend our consideration of audit committee *composition* related to financial expertise, by considering companies' *designation* decisions. While all committee members likely contribute to discussion of issues brought before the committee, the decision to publicly designate specific individuals as officially fulfilling requirements of SOX 407 is an important object of study in itself. Designated financial experts might bear the greater responsibility and legal liability (Carcello et al. 2006; Carcello et al. 2008). While companies may designate the most highly qualified audit committee members as financial experts, highly accomplished audit committee members might not be willing to be designated due to litigation concerns. To investigate this issue, we separately examine designated and non-designated financial experts. We also extend prior research by testing whether voluntary designation of more than one financial expert is associated with the ICFR effectiveness. As noted by Carcello et al. (2006, 357), the likely sign of association is unclear *ex ante*: "some companies may name multiple experts ... as a means of diffusing the responsibility and potential liability that may fall on one person if only a single financial expert is named. Alternatively, some companies may believe that having more than one financial expert contributes to audit committee effectiveness." The former explanation suggests a positive association of multiple experts with financial reporting risk, while the latter suggests a negative association.

Beyond financial expertise, prior research also considers audit committee characteristics such as size and number of meetings as indicators of monitoring quality.[10] As recommended by the Blue Ribbon Committee (BRC 1999), the major stock exchanges in the U.S. require listed companies to include at least three directors on audit committees, implying that larger audit committees are an index of quality. However, prior research tends not to find an association of audit committee size with financial reporting or internal control quality (e.g., Abbott et al. 2004; Krishnan and Visvanathan 2008; Krishnan 2005; Zhang et al. 2007). The number of audit committee meetings is commonly considered a measure of diligence: fewer meetings can indicate lack of commitment and/or insufficient time for effective monitoring. McMullen and Raghunandan (1996), Beasley et al. (2000), Farber (2006), and Archambeault and DeZoort (2001) observe fewer audit committee meetings among firms with restatements, SEC enforcements, fraud, and suspicious auditor switches, respectively. However, in the current environment, the direction of causality implied in an association of audit committee meetings with MW may run in the opposite direction; i.e., more audit committee meetings may occur as a *result* of discovering a MW in a given period (Carcello et al. 2006, 368). Evidence for an association of internal control effectiveness with audit committee size or diligence is inconclusive, as Zhang et al. (2007) do not find either variable to be associated with MW disclosure.

Prior literature also assesses corporate governance at the board level, considering size, independence, and meeting frequency. Research findings are mixed. Larcker et al. (2007)

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[10] Another aspect of audit committee governance considered by prior research is the independence of its members from management. For instance, Krishnan (2005) finds that more independent audit committees are less likely to issue 8-Ks with MW disclosures. However, since SOX Section 301 now requires audit committee members to be independent, there is insufficient variance in this measure, and we do not include it in the study.

find varying evidence on the association of board characteristics with abnormal accruals, as do Krishnan and Visvanathan (2008). Xie et al. (2003) and Klein (2002b) both find that accruals quality is associated with board independence, and Beasley (1996) finds that more independent boards have lower likelihood of fraud. However, Bushman et al. (2004) find no association of board characteristics with earnings timeliness. Using composite governance scores that combine board and audit committee composition and activity, both DeFond et al. (2005) and Carcello et al. (2008) conclude that strong corporate governance contributes to financial reporting quality. Considering studies of internal control effectiveness, Doyle et al. (2007) do not find an association of a corporate governance quality index and the overall likelihood of disclosing MW (but do find an association with MW in revenue recognition only). Zhang et al. (2007) find that MW disclosure is associated with smaller boards and more board meetings. Neither they nor Krishnan (2005) find an association of MW disclosure with board independence.

In sum, this study addresses our first research question by examining the association of several corporate governance mechanisms with internal quality as measured by MW disclosures. Our corporate governance measures are summarized in Panel A of Figure 1.

Alternative Regulatory Regimes for Disclosure of Internal Control Effectiveness

Our second research question asks whether there are differential associations of MW disclosure with corporate governance quality in the Section 302 and 404 regimes. Section 404 is more stringent in that it requires registrants to document and test ICFR effectiveness, and their external auditors to independently test those controls and offer a separate opinion on internal control effectiveness. Under Section 302, companies are required to design and maintain appropriate controls over the financial reporting and disclosure functions.[11] Management must assert the effectiveness of "disclosure controls" in the 10-Q, as well as report any detected MW. Control testing is not required under Section 302, nor is a separate auditor opinion.[12] Section 404 was initially required only for certain companies meeting certain criteria set by the SEC (termed "accelerated filers"), with the intention of eventual application to all public companies. However, expansion beyond accelerated filers was delayed several times due to outcry from the business community regarding the high cost of testing controls, and few other countries have implemented regulations as stringent as Section 404.[13] However, if a Section 404-type process (with required controls testing by auditors) is not in place, then the markets must rely more on corporate governance to impose the discipline of effective ICFR. If corporate governance is effective in monitoring management, detecting and disclosing internal control problems without Section 404's testing and auditor involvement requirements, then better governance mechanisms should be associated with higher internal control quality (less likelihood of a MW) in Section 302 as well as Section 404 disclosures.

However, a key difference between these provisions is that Section 302 testing is voluntary. While prior research shows that corporate governance mechanisms are associated

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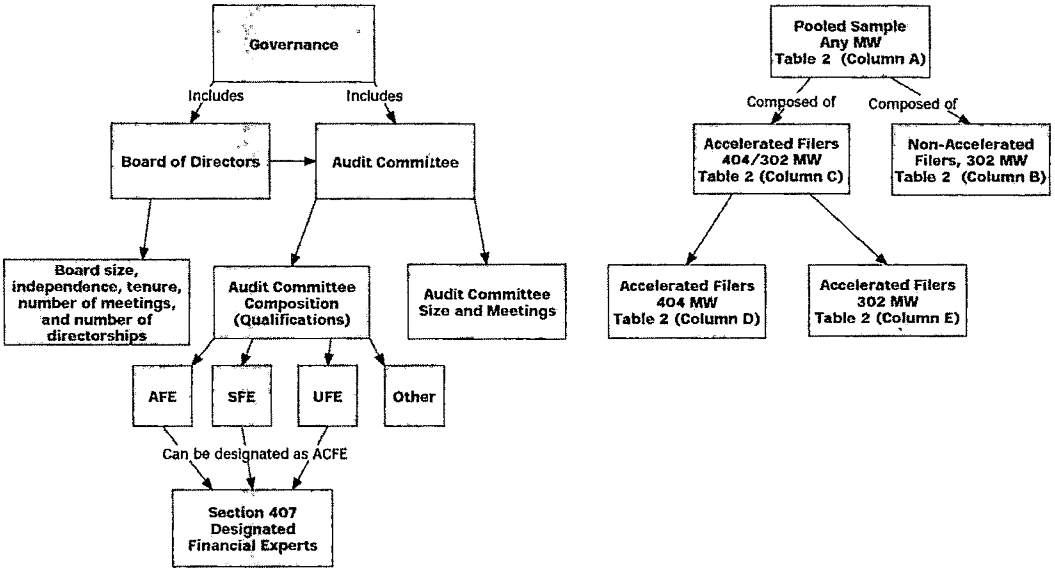
[11] Bedard and Graham (2008) note that over 70 percent of internal control problems detected under Section 404 activity are not documentation problems, but rather are due to missing, ineffective or insufficiently tested controls. This implies that without mandatory testing, many problems will be missed.

[12] While both Sections 302 and 404 require companies to disclose MW that are detected in ICFR, they differ somewhat in the scope of controls considered. We describe this difference in a following section, and consider it in our analysis.

[13] No country other than Japan has adopted a mandatory internal control testing regulation similar to Section 404. However, other jurisdictions (including the European Union, Canada, and Australia) have regulations similar in spirit to Section 302.

FIGURE 1
Schematic of Research Design



Panel A: Corporate Governance Measures **Panel B: Samples**

Governance
Includes
Includes
Board of Directors
Audit Committee
Board size, independence, tenure, number of meetings, and number of directorships
Audit Committee Composition (Qualifications)
Audit Committee Size and Meetings
AFE
SFE
UFE
Other
Can be designated as ACFE
Section 407 Designated Financial Experts
Pooled Sample Any MW Table 2 (Column A)
Composed of
Composed of
Accelerated Filers 404/302 MW Table 2 (Column C)
Non-Accelerated Filers, 302 MW Table 2 (Column B)
Accelerated Filers 404 MW Table 2 (Column D)
Accelerated Filers 302 MW Table 2 (Column E)

SOX Section 407: Requires companies to designate at least one audit committee member as a financial expert, or explain why no one is so designated.
SOX Section 404: Requires management to document and test internal controls over financial reporting, and auditors to test and opine on control effectiveness. Material weaknesses discovered and not remediated by the report date must be publicly disclosed.
SOX Section 302: Requires management to document effectiveness of disclosure controls and publicly disclose changes in those controls as well as specific material weaknesses.
AFE (Accounting Financial Experts): Individuals with direct experience in preparing or auditing financial reports (e.g., CPAs and CFOs).
SFE (Supervisory Financial Experts): Individuals with experience in supervising the financial function (e.g., CEOs, board chairs).
UFE (User Financial Experts): Individuals with experience performing extensive financial statement analysis or evaluation (e.g., financial analysts, investment bankers).
Accelerated Filers: Companies that have at least $75 million of common equity float, have previously filed at least one 10-K, are subject to the Exchange Act for at least 12 months, and do not qualify as a small business under SEC rules.
Non-Accelerated Filers: Public companies not qualifying as accelerated filers.

with better disclosures (Eng and Mak 2003; Laksmana 2008), the current context differs in a fundamental way from other voluntary disclosure issues considered in financial reporting research. In other contexts, the information being considered for disclosure (of a positive, negative, or neutral nature) is usually known to management, and the issue is whether that information should be shared outside the firm. In contrast, companies under Section 302 could, but are not required to, voluntarily test ICFR (a costly activity), with the possibility of finding and having to disclose bad news. While reporting of any MW discovered through this process is technically mandatory, the categorization of detected problems as "material weakness" is based on two criteria that are difficult to judge: the probability and materiality of a future misstatement.[14] Thus, managers must trade off costs of information discovery as well as costs of disclosure, when disclosure of the discovered information may reduce equity valuation (Hammersley et al. 2008) and increase cost of capital (Ashbaugh-Skaife et al. 2007).

Given the disincentives to detect and disclose negative information under Section 302, it likely that the association of corporate governance quality with ICFR effectiveness will only be apparent among companies subject to Section 404. We investigate this issue by modeling within each regime the association of audit committee financial expertise and other corporate governance variables with internal control effectiveness. If corporate governance quality is associated with financial reporting quality, as proxied in this study by internal control quality, then we expect that less well-governed companies will have a higher likelihood of MW. If less well-governed companies with MW do not detect/disclose their control problems under Section 302, then these problems will not be visible to the public, and the expected association will not be measurable.

III. METHOD

Development of Sample

Our sample is based on entities with coverage in the AuditAnalytics database. We first identify 10,568 firm-years for fiscal years ending November 2004 to May 2006, and eliminate reporting entities that do not have board or audit committee data, have a board or audit committee with only one member, or did not meet during the fiscal year, leaving 8,192 firm-years.[15] Because we codify audit committee financial expertise based on information in the biographical sketch taken from the proxy statement, we restrict our sample to companies for which we have a complete set of biographies for audit committee members, leaving 6,576 firm-years and 22,873 audit committee members.[16] We collect internal control disclosures (Section 404 for accelerated filers and Section 302 for accelerated as well as non-accelerated filers), along with data on auditor changes, mergers and acquisitions, institutional holding, business segments, and other financial information from AuditAnalytics, SDC Platinum, Thomson Financials, Compustat Segment data, and Compustat Annual files, respectively. After eliminating firms with missing values, our final sample contains 5,480 firm-year observations (3,911 accelerated and 1,569 non-accelerated filers) with complete data, and 19,673 audit committee members.

Dependent Variables

Our dependent variable is the disclosure of a material weakness (*MW*) in internal control over financial reporting. *MW* is coded as 1 if the company has at least one material weakness in the respective sample, and 0 otherwise. In the *POOLED* sample (which combines accelerated and non-accelerated filers), *MW* equals 1 if the Section 404 report or at least one of the quarterly Section 302 reports indicates that the internal controls contained at least one MW in the sample period, and 0 otherwise. In our first partition of the pooled sample, we distinguish accelerated from non-accelerated filers. Throughout our sample period, accelerated filers were required to comply with Section 404 (for annual reports) as well as Section 302 (for quarterly reports). Thus, in the *ACCELERATED* sample, *MW* equals 1 for those accelerated filers reporting MW under Section 404 or 302, as above. In the *NONACCELERATED* sample, *MW* equals 1 if a MW is disclosed under Section 302, and 0 otherwise. To further isolate the effects of regulatory regime, we then separate MW disclosures for accelerated filers into those resulting from Section 302 and 404. In the *ACCELERATED-404* sample, *MW* equals 1 for those accelerated filers initially reporting a specific MW under Section 404, while in the *ACCELERATED-302* sample, *MW* equals 1 for disclosure of a MW in Q1–Q3 without disclosure of a MW in the fourth quarter of the preceding year (i.e., a specific MW was initially reported under Section 302), and 0 otherwise. The sample structure is shown in Figure 1, Panel B.

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[14] We are aware of only one study investigating classification of detected problems in internal control by company managements versus auditors. Bedard and Graham (2008) find that 84 percent of Section 404 MW are detected by the auditor. Of those MW (and components of MW) detected by clients, management initially coded 71 percent of them as less severe than a MW.

[15] AuditAnalytics covers entities that are required to file reports with the SEC. The sample attrition at this stage is partially due to the lack of board data for entities such as venture capital firms and real estate investment trusts.

[16] Of the 1,616 audit committees with missing biographical information, 1,097 observations are excluded because of only one missing biography.

Independent Variables: Corporate Governance

To form audit committee financial expertise variables, we obtain data using a parsing routine, as follows. First, we constructed a software "robot" using Perl, a programming language. This robot was used to download information on board and committee characteristics from AuditAnalytics, which is contained in HTML pages. Using a similar robot, we then downloaded biographical information for all audit committee members. Next, we parsed the HTML pages into text files and uploaded the data into a SAS dataset. Finally, we parsed the biographical information for each audit committee member by searching for common words and abbreviations that describe the qualifications of an individual in his/her biography.

We classify an audit committee member as an "accounting financial expert" (AFE) if biographical data indicate that the individual has at least one of the specific qualifications mentioned in the SEC's final rule: CPA, certified public accountant, CFO, chief financial officer, principal financial officer, chief accounting officer, principal accounting officer, treasurer, auditor, vice president-finance, vice president of finance. We then classify as "supervisory financial experts" (SFE) audit committee members whose biographies contain at least one of the following titles (and who are not classified as an accounting financial expert): CEO, chief executive officer, COO, chief operating officer, and chairman of the board. To validate this procedure, we selected a random sample of 100 biographies and manually compared the automated classification to the biography text. Because only a single misclassification was found (due to spelling in the bio as "certificed public accountant"), we infer that our parsing procedure is highly accurate. Consistent with other recent studies (e.g., Lee et al. 2004; Carcello and Neal 2003; Zhang et al. 2007) we define financial expertise in our main analysis as the proportion of individuals with various types of experience: *PAFE* (the proportion of all audit committee members with accounting expertise qualifications) and *PSFE* (the proportion of all audit committee members with supervisory expertise qualifications).

While our AFE and SFE measures are highly accurate, we were unable to accurately parse the SEC's third category (experience as a financial statement user or individuals with "extensive financial statement analysis or evaluation," such as investment bankers, venture capitalists, and financial analysts) due to the variety of terminology used to describe those qualifications. Instead, because companies can only officially "designate" (i.e., publicly identify) as financial experts under Section 407 individuals in one of the three groups, we identify user financial experts (UFE) as those individuals designated by their companies, who do not have accounting or supervisory qualifications. We obtain designation data for a subset of our complete sample.[17] In the designation subsample, we compare MW disclosure among companies choosing to designate an audit committee member with accounting, supervisory, or user expertise, and those companies choosing to designate multiple financial experts. For these tests, we develop a series of indicator variables (*AFE-DES*, *SFE-DES*, *UFE-DES*, and *MULT-DES*) that equal 1 for companies designating a single accounting, supervisory or user financial expert, or multiple financial experts, respectively, and 0 otherwise.

Prior research on corporate governance also examines audit committee characteristics of independence, activity, and size. Audit committee independence has been the subject of a number of studies examining the period preceding SOX (e.g., Klein 2002a; Abbott et al. 2004; Krishnan 2005). SOX Section 301 recognizes the importance of independence by requiring all audit committees members to be unaffiliated with management. Thus, due to lack of variation in independence we do not include this construct in our models, but rather concentrate on number of meetings in the fiscal year (*ACMEETING*), and size (*ACSIZE*), which is an indicator variable equal to 1 if the total number of individuals serving on the audit committee is greater than the sample median, and 0 otherwise, as in DeFond et al. (2005).[18]

Consistent with prior studies such as Dhaliwal et al. (2007) and Carcello et al. (2008), we measure the overall strength of the board of directors using a score based on several factors: size, independence, tenure, number of meetings, and the average number of directorship held by non-executive directors. First, there is evidence suggesting that smaller boards are associated with good governance (Yermack 1996; Core et al. 1999). Thus, our board size score accepts the value of 1 if the size of the board is smaller than the median board size in our sample, and 0 otherwise. Previous research also suggests that board independence is associated with positive outcomes (Beasley 1996; Klein 2002b). Thus, for each firm, we first calculate the proportion of independent board members and then calculate the median of this proportion across firms. Our board independence score accepts the value of 1 if the board independence is greater than the median, and 0 otherwise. Prior research also suggests that longer tenure of directors on the board and the audit committee is associated with less fraud and earnings management (Beasley 1996; Bédard et al. 2004). Consequently, we calculate the average tenure among the independent board members for each firm, and the median tenure across our sample. Our board tenure score accepts 1 if the average tenure is above the median for our sample, and 0 otherwise. Additionally, research has used the number of board meeting as an indicator for board diligence (Carcello et al. 2002). We calculate the sample median for the number of board meetings, and assign a score of 1 if the number of meetings is above the sample median, and 0 otherwise. Last, prior research suggests that the number of directorships of board members can proxy for expertise and capital reputation (Fama 1980; Fama and Jensen 1983; Carcello et al. 2002). Thus, we calculate the average number of board seats held by independent directors. Our "board reputation" score accepts 1 if the average number of boards seats held by independent directors is above the sample median, and 0 otherwise. The sum of these five component scores is our composite variable for board strength (*BOARD-STRENGTH*).

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[17] The designation sample is reduced because data are taken from two different sources. Some data loss occurs because we must match individual audit committee members by name between the two files. Our results are not sensitive to using numbers instead of proportions for the audit committee expertise variables.

[18] Our data can only distinguish insiders from outsiders; hence we define independent board members as those who are not employed by the firm. Among accelerated filers, 99 percent of audit committee members are non-executives; this percentage is 97 percent among non-accelerated filers. When the proportion of independent audit committee members is included in our models, it is not significant and does not affect the significance of other test variables. Similar results are obtained using an indicator variable for fully independent audit committees.

Control Variables

Consistent with prior research on the determinants of internal control effectiveness (e.g., Ashbaugh-Skaife et al. 2007; Doyle et al. 2007), we use control variables measuring company size, financial health, complexity, business changes, industry risk, auditor type, and auditor change. We control for company size using the natural log of the market value of equity (*LOGMARKETCAP*) expecting a negative association (i.e., smaller filers are more prone to disclose MW). We include a measure of profitability through a dummy variable capturing recent losses (*LOSS*). We expect a positive association with MW disclosure because financially weaker companies might have fewer resources to invest in a system of controls and/or remediate their internal controls. We capture complexity and recent changes by including the number business and geographic segments (*SEGMENT*), a dummy for foreign operations (*FOREIGN*), recent mergers (*MERGER*), restructuring (*RESTRUCTURE*), and fast growth (*EXTREMEGROWTH*). We expect a positive association between the complexity variables and MW disclosure. We control for auditor type using indicator variables for companies audited by Big 4 auditors (*BIG4*) and for those audited by BDO Seidman and Grant Thornton (*MIDTIER*), expecting a positive association with MW disclosure (see also Ashbaugh-Skaife et al. 2007). We also expect that recent auditor changes (*AUDITORCHANGE*) might be associated with MW disclosure (e.g., Ettredge et al. 2007). We control for industries more prone to litigation (*LITIGATION*) to capture some elements of control risk (Ashbaugh-Skaife et al. 2007). Finally, we include an indicator variable to control for differences across years (*FY2005*).[19]

Model

We study the likelihood of disclosing MW as a function of the characteristics of the audit committee and the board of directors, as well as the control variables mentioned above. Our basic model is the following logistic regression:

$$\begin{aligned} MW = \alpha &+ \beta_1 PAFE + \beta_2 PSFE + \beta_3 AUDITMEETING \\ &+ \beta_4 AUDITCOMMITTEESIZE + \beta_5 BOARD\text{-}STRENGTH \\ &+ \beta_6 LOGMARKETCAP + \beta_7 LOSS + \beta_8 SEGMENT + \beta_9 FOREIGN \\ &+ \beta_{10} MERGER + \beta_{11} RESTRUCTURE + \beta_{12} EXTREMEGROWTH \\ &+ \beta_{13} BIG4 + \beta_{14} MIDTIER + \beta_{15} AUDITORCHANGE \\ &+ \beta_{16} LITIGATION + \beta_{17} FY2005 + e. \end{aligned}$$

IV. RESULTS

Descriptive Statistics

Table 1 presents descriptive data for the sample, separately for accelerated filers and non-accelerated filers. These comparative statistics are in themselves interesting because

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[19] Because our sample contains two years of data, we test sensitivity of our results to controlling for lack of independence in observations using clustering (e.g., Wooldridge 2002). Results are unchanged using this procedure.

TABLE 1
Descriptive Statistics and Variable Definitions, by Filing Status

Panel A: Descriptive Statistics

	Accelerated Filers (n = 3,911)			Non-Accelerated Filers (n = 1,569)		
Variable	**Mean**	**Median**	**Std. Dev.**	**Mean**	**Median**	**Std. Dev.**
MW	0.16***	0.00	0.32	0.09	0.00	0.28
AUDITMEETING	8.40***	8.00	3.52	5.51	5.00	2.66
AUDITCOMMITTEESIZE	3.68***	3.00	0.92	3.30	3.00	0.87
BOARD-STRENGTH	2.41***	2.00	0.97	2.03	2.00	0.96
LOGMARKETCAP	6.76***	6.60	1.57	3.67	3.77	1.33
LOSS	0.27	0.00	0.44	0.49***	0.00	0.50
SEGMENT	5.16***	4.00	4.48	3.98	3.00	3.47
FOREIGN	0.28***	0.00	0.45	0.16	0.00	0.37
MERGER	0.25***	0.00	0.43	0.10	0.00	0.30
RESTRUCTURE	0.23***	0.00	0.42	0.10	0.00	0.29
EXTREMEGROWTH	0.17	0.00	0.38	0.19	0.00	0.39
BIG4	0.86***	1.00	0.35	0.36	0.00	0.48
MIDTIER	0.06	0.00	0.24	0.14***	0.00	0.35
AUDITORCHANGE	0.08	0.00	0.26	0.15***	0.00	0.36
LITIGATION	0.20	0.00	0.40	0.22	0.00	0.41
Accounting Financial Expertise						
Proportion (*PAFE*)	0.22**	0.25	0.22	0.20	0.20	0.23
Number (*#AFE*)	0.77***	1.00	0.76	0.63	1.00	0.69
Supervisory						
Proportion (*PSFE*)	0.41***	0.33	0.28	0.34	0.33	0.28
Number (*#SFE*)	1.51***	1.00	1.13	1.11	1.00	0.94

Panel B: Variable Definitions

MW = indicator variable equal to 1 if MW was first disclosed in Section 404 report (for *ACCELERATED-404*) or if it was first disclosed in at least one of the quarterly Section 302 reports (for *ACCELERATED-302* or *NONACCELERATED*), and 0 otherwise;

PAFE = proportion of accounting experts serving on the audit committee, based on total audit committee size (individuals whose bios indicate qualifications consistent with the SEC's definition (see text) [AuditAnalytics];

PSFE = proportion of supervisory experts serving on the audit committee, based on total audit committee size (individuals whose bios indicate qualifications consistent with the SEC's definition (see text) [AuditAnalytics];

PAFE-DES = proportion of designated accounting experts serving on the audit committee, based on total audit committee size (individuals whose bios indicate qualifications consistent with the SEC's definition (see text) [AuditAnalytics];

PAFE-NOTDES = proportion of accounting experts who are not designated but serve on the audit committee, based on total audit committee size (individuals whose bios indicate qualifications consistent with the SEC's definition (see text) [AuditAnalytics];

(*continued on next page*)

TABLE 1 (continued)

PSFE-DES = proportion of designated supervisory experts serving on the audit committee, based on total audit committee size (individuals whose bios indicate qualifications consistent with the SEC's definition (see text) [AuditAnalytics];

PSFE-NOTDES = proportion of supervisory experts who are not designated but serve on the audit committee, based on total audit committee size (individuals whose bios indicate qualifications consistent with the SEC's definition (see text) [AuditAnalytics];

AFE-DES = indicator variable equal to 1 if the company has designated a single individual with accounting expertise, and 0 otherwise;

SFE-DES = indicator variable equal to 1 if the company has designated a single individual with supervisory expertise, and 0 otherwise;

UFE-DES = indicator variable equal to 1 if the company has designated a single individual with user expertise, and 0 otherwise;

MULT-DES = indicator variable equal to 1 if the company has designated more than one individual, and 0 otherwise;

AUDITMEETING = number of meetings held by the audit committee for the fiscal year 2004 [AuditAnalytics];

AUDITCOMMITTEESIZE = number of members serving on the audit committee in 2004 [AuditAnalytics];

BOARD-STRENGTH = composite score comprising board size, proportion of independent board members, board tenure, board meetings, and outside board memberships; range = 0 (weak) to 5 (strong);

LOGMARKETCAP = log of share price times the number of shares outstanding [Compustat data item #25 * Compustat data item #199];

LOSS = indicator variable equal to 1 if the company had net loss in any of the last two years, and 0 otherwise [Compustat data item #172];

SEGMENT = sum of reported business and geographic segments in 2004 (Compustat Segment file);

FOREIGN = indicator variable equal to 1 if the company has non-zero foreign currency translation, and 0 otherwise [Compustat data item #150];

MERGER = indicator variable equal to 1 when the client has experienced a merger in the past two years, and 0 otherwise [SDC Platinum];

RESTRUCTURE = indicator variable equal to 1 if a firm was involved in a restructuring, and 0 otherwise; coded as 1 if any of the following Compustat data items are non-zero: 376, 377, 378 or 379;

EXTREMEGROWTH = indicator variable equal to 1 if year over year industry-adjusted sales growth [data item #12] falls into the top quintile, and 0 otherwise;

BIG4 = indicator variable equal to 1 when the auditor is a Big 4 firm, and 0 otherwise [AuditAnalytics];

MIDTIER = indicator variable equal to 1 when the auditor is a mid-tier firm (Grant Thornton or BDO Seidman), and 0 otherwise [AuditAnalytics];

AUDITORCHANGE = indicator variable equal to 1 if the company changed auditors, and 0 otherwise [AuditAnalytics]; and

LITIGATION = indicator variable equal to 1 if a firm is in a litigious industry (SIC codes 2833 to 2836, 3570–3577, 3600–3674, 5200–5961, and 7370), and 0 otherwise.

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*, **, *** Indicate significant effects in two-tailed tests at the < 0.10, < 0.05, and < 0.01 levels, respectively.
The table presents descriptive statistics on dependent and independent variables separated by accelerated and non-accelerated filers.

prior research related to audit committee qualifications uses small samples and/or concentrates on larger companies. Table 1, Panel A shows a number of differences between accelerated and non-accelerated filers. Particularly, accelerated filers are more likely to disclose MW (16 versus 9 percent, $p < 0.01$).[20] Because it is unlikely that smaller companies are better controlled than larger companies, this difference is likely due to the more rigorous requirements of ICFR documentation and testing by companies and auditors in Section 404, relative to Section 302. Accelerated and non-accelerated filers also differ on some measures of corporate governance. Particularly, accelerated filers have larger audit committees (3.68 versus 3.30 members, $p < 0.01$) that meet more frequently (8.40 versus 5.51 meetings, $p < 0.01$). Audit committees of accelerated filers have significantly more audit committee members with supervisory qualifications (41 versus 34 percent, $p < 0.01$) and accounting qualifications (22 versus 20 percent, $p < 0.05$).

Table 1, Panel A also shows that accelerated filers also differ from non-accelerated filers on other dimensions (all significant at $p < 0.01$). They are less likely to experience net loss (27 versus 49 percent), have more complex operations measured by number of business and geographic segments (5.16 versus 3.98), frequency of mergers (25 versus 10 percent), restructuring (23 versus 10 percent), and foreign operations (28 versus 16 percent). Accelerated filers are more likely to be audited by a Big 4 firm (86 versus 36 percent), and less likely to be audited by a mid-tier firm (6 versus 14 percent). Finally, they are less likely to have changed auditors (8 versus 15 percent). Overall, the differences between the two groups emphasize the need to model them separately.

Models of Audit Committee Composition and Other Corporate Governance Characteristics

Table 2 presents results of logistic regression models testing the association of audit committee characteristics (financial expertise composition, size, and meetings) and board strength with MW disclosure.[21] We address our first research question using a model explaining MW disclosure among all companies in the sample, with results shown in Column A. In this pooled model, both *PAFE* and *PSFE* are significantly associated with reduced likelihood of MW disclosure ($p < 0.05$), implying that audit committees with higher proportions of accounting or supervisory expertise have higher ICFR quality.[22] These results confirm prior findings on accounting expertise, and build on prior research that does not isolate effects of supervisory expertise in the MW context. Column A also shows that size of the audit committee is not associated with MW disclosure, consistent with prior research on MW as well as on properties of earnings and restatements. However, the positive and significant coefficient on *AUDITMEETING* ($p < 0.01$) contrasts with both Zhang et al. (2007), who find no association with MW, and with prior studies of discretionary accruals and restatements (Xie et al. 2003; Abbott et al. 2004), who find that more audit committee meetings are associated with higher financial reporting quality. We infer that, as suggested by Carcello et al. (2006), audit committee meetings in the MW context are probably not proxying for *ex ante* diligence. Rather, audit committees may be reacting to the discovery of MW by meeting more frequently in order to communicate with external auditors and management regarding the detected problems.

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[20] In our sample, 11 accelerated filers and three non-accelerated filers reported MW in 2003 but not in 2004, while 11 other accelerated filers and 14 non-accelerated filers reported MW in both years.

[21] To assess the extent of multicollinearity in our models, we use variance inflation factors (VIF) computed using OLS regression with the same dependent and independent variables. Our tests show that the highest VIF is 1.95 (for *BIG4*), which is well below the level suggestive of multicollinearity problems (Neter et al. 1996).

[22] Results of Table 2 models are similar using the number of AFEs and SFEs, rather than proportions. Comparing the magnitude of the coefficients of *PAFE* and *PSFE*, we find they are not significantly different. We also test sensitivity of our results to excluding individuals with expertise as a board chair from the *PSFE* variable, and find that results are similar. The only exception is the coefficient on *PSFE* in Column C, which is not significant.

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TABLE 2
Logistic Regressions of Material Weakness on Governance and Control Variables

Variable	Predicted Sign	A. All Sample Coefficient (Wald Chi-Square)	B. Non-Accelerated (302) Coefficient (Wald Chi-Square)	C. Accelerated-All Coefficient (Wald Chi-Square)	D. Accelerated-404 Coefficient (Wald Chi-Square)	E. Accelerated-302 Coefficient (Wald Chi-Square)
Intercept		−2.676 (136.331***)	−4.179 (74.388***)	−1.278 (14.783***)	−1.237 (1.685*)	−5.033 (26.045***)
ACCELERATED	+	0.805 (29.583***)				
PAFE	−	−0.491 (4.667**)	−0.028 (0.004)	−0.573 (4.575**)	−0.695 (6.031***)	0.284 (0.014)
PSFE	−	−0.348 (3.765**)	−0.306 (0.743)	−0.308 (2.148*)	−0.379 (2.974**)	0.167 (0.074)
AUDITMEETING	?	0.093 (54.095***)	0.089 (8.027***)	0.095 (46.162***)	0.084 (32.407***)	0.188 (27.727**)
AUDITCOMMITTEESIZE	−	−0.064 (0.455)	−0.173 (0.797)	1.120 (1.218)	1.108 (0.888)	0.338 (1.210)
BOARD-STRENGTH	−	−0.130 (7.391***)	−0.110 (1.220)	−0.130 (5.573***)	−0.141 (6.049***)	−0.018 (0.013)
LOGMARKETCAP	−	−0.187 (26.786***)	−0.034 (0.200)	−0.237 (33.822***)	−0.241 (32.333***)	−0.215 (3.067**)
LOSS	+	0.618 (34.932***)	0.835 (14.265***)	0.546 (20.267***)	0.497 (15.033***)	1.145 (11.393***)
SEGMENT	+	0.045 (15.643***)	0.059 (4.282**)	0.414 (10.730***)	0.046 (12.423***)	0.003 (0.008)
FOREIGN	+	0.298 (7.925***)	0.513 (4.831**)	0.259 (4.681**)	0.196 (2.393*)	0.809 (6.288***)

(*continued on next page*)

TABLE 2 (continued)

		A. All Sample	B. Non-Accelerated (302)	C. Accelerated-All	D. Accelerated-404	E. Accelerated-302
Variable	**Predicted Sign**	**Coefficient (Wald Chi-Square)**	**Coefficient (Wald Chi-Square)**	**Coefficient (Wald Chi-Square)**	**Coefficient (Wald Chi-Square)**	**Coefficient (Wald Chi-Square)**
MERGER	+	−0.027	0.221	−0.077	−0.063	−0.213
		(0.050)	(0.516)	(0.363)	(0.221)	(0.317)
RESTRUCTURE	+	0.0163	0.428	0.137	0.128	0.166
		(2.063*)	(2.520*)	(0.183)	(0.928)	(0.240)
EXTREMEGROWTH	+	0.044	0.152	−0.002	−0.107	0.640
		(0.133)	(0.395)	(0.000)	(0.511)	(3.565**)
BIG4	+	0.163	0.203	0.118	0.189	−0.422
		(2.182)	(0.764)	(0.327)	(0.714)	(0.713)
MIDTIER	+	0.594	0.537	0.646	0.823	−0.619
		(11.722***)	(4.343**)	(6.745***)	(9.674***)	(0.847)
AUDITORCHANGE	+	0.699	1.172	0.497	0.341	1.197
		(28.050***)	(28.808***)	(8.253***)	(3.238**)	(9.336***)
LITIGATION	+	−0.057	−0.038	−0.077	0.019	−0.985
		(0.256)	(0.030)	(0.336)	(0.020)	(5.122**)
FY2005	?	−0.107	0.085	−0.407	−0.364	0.619
		(1.087)	(15.048***)	(12.085***)	(8.752***)	(3.370*)
Nagelkerke R^2		0.104	0.147	0.110	0.098	0.185
Sample Size		5,480	1,569	3,911	3,800	3,509
# of Companies with Material Weakness		589	136	453	402	51

*, **, *** Indicate significant effects with probability levels one-tailed for directional expectations at the < 0.10, < 0.05, and < 0.01 levels, respectively.

The table presents results for estimating the likelihood of disclosing MW.

Column A presents results for the full sample including accelerated and non-accelerated filers.

Column B includes only non-accelerated filers.

Column C includes only accelerated filers.

Columns D and E include only accelerated filers, separating reported MW by regulatory regime: Column D uses MW reported under Section 404, while Column E uses MW reported under Section 302.

Variables are defined in Table 1.

Regarding other corporate governance measures, we find that the coefficient on *BOARD-STRENGTH* in Column A is negative and significant ($p < 0.01$). This suggests that the overall board, while not as directly involved as the audit committee, still plays a role in influencing the effectiveness of ICFR. This is consistent with Doyle et al. (2007), who find a negative association of board quality with MW (but only for those weaknesses related to revenue recognition).[23] Among control variables, we find that company size (*LOGMARKETCAP*) is negative and significant ($p < 0.01$), and *SEGMENT* and *FOREIGN* are positive and significant. These results are both consistent with Doyle et al. (2007) but not with Zhang et al. (2007), who find no significance on those variables. *AUDITORCHANGE* is positive and significant ($p < 0.01$), consistent with Zhang et al. (2007). Also consistent with that study, we find no association of *BIG4* with MW disclosure. However, we do find a positive and significant association of *MIDTIER* ($p < 0.01$), a variable not separately considered by prior studies of MW disclosure. *LOSS* is positive and significant ($p < 0.01$), echoing the finding of Doyle et al. (2007) that firms in financial distress have higher likelihood of MW. *FY2005* is not associated with MW disclosure in the pooled sample.

Our second research question concerns whether the anticipated association of corporate governance with ICFR effectiveness will be observed in both the Section 404 and 302 regulatory regimes. To address this question, we first divide the sample into non-accelerated filers (subject only to Section 302, Column B) and accelerated filers (subject to both Section 404 and 302, Column C). Column B shows that, contrary to the pooled model, neither audit committee financial expertise composition nor board strength is significant. However, the number of audit committee meetings remains significant ($p < 0.01$), as do *MIDTIER*, *LOSS*, *SEGMENT*, *FOREIGN*, and *AUDITORCHANGE*. In contrast to the pooled model, the coefficient on *FY2005* in Column B is positive and significant ($p < 0.01$), indicating that the likelihood of non-accelerated filers disclosing a Section 302 MW is higher in FY 2005 than in FY 2004.

Turning to accelerated filers, Column C shows that *PAFE* ($p < 0.05$), *PSFE* ($p < 0.10$), and stronger boards ($p < 0.01$) are all associated with reduced likelihood of MW disclosure. Results on control variables are similar to the non-accelerated filers, with two exceptions. *LOGMARKETCAP* is negative and significant in the accelerated model ($p < 0.01$), and the *FY2005* indicator is also negative and significant ($p < 0.01$). The latter indicates that among accelerated filers, the overall likelihood of disclosing MW is lower in FY 2005 than in FY 2004. In summary, the results in Columns B and C of Table 2 imply that the negative association of corporate governance quality with MW disclosure is evident for accelerated, but not for non-accelerated, filers.

While considering the above results, it is important to note that the comparison of regimes in Columns B and C is not precise because accelerated filers are subject to both Sections 404 and 302. To provide a more direct comparison across regimes, Columns D and E present results of estimating the model among accelerated filers for MW reported under Section 404 and 302, respectively. Column D shows that when only Section 404 MW disclosures are modeled, our findings on corporate governance variables in Column C continue to hold. However, using Section 302 MW data, Column E shows that no governance variable other than *AUDITMEETING* is significant. Further, *FY2005* is negative in

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[23] While we follow other studies (Dhaliwal et al. 2007) in using a summary measure of board strength, other studies separately examine components of our measure. Zhang et al. (2007) find effects of size and number of board meetings. However, neither they nor Krishnan (2005) find a significant association of MW with board independence.

Column D (Section 404), but positive in Column E (Section 302). These results suggest that the reason for differences in associations of MW with governance mechanisms and year in Column B versus Column C lies in the regime, not with some other factor intrinsic to accelerated versus non-accelerated filers.

Because a major distinction between accelerated and non-accelerated filers in the SEC's definition is market capitalization, the question arises as to whether our results are driven by company size and not by regulatory regime. To address this issue, we create subsamples of the upper 20th (15th; 10th) percentiles of market capitalization of non-accelerated filers, and the lower 20th (15th; 10th) percentiles of accelerated filers, to determine whether our results still hold among these subsamples of companies more similar in size. We also separate Section 404 and 302 disclosures for the smaller accelerated filers. Results are shown in Table 3 (for efficiency, we table only the 20th percentile partition, but results are similar with the other partitions). Table 3 shows that the coefficients on both *PAFE* and *PSFE* remain negative and significant for the smaller accelerated filers. However, results on test variables are not significant for the larger non-accelerated filers. We conclude that differences in our audit committee financial expertise results between accelerated and non-accelerated filer groups are due to differences in the regulatory regime and not company size.[24]

In sum, results in Tables 2 and 3 show that corporate governance is associated with ICFR effectiveness only when the measure of controls effectiveness is derived from Section 404 data. In answer to our second research question, these results imply that only under Section 404 is it evident that better governed companies are less likely to disclose MW.

Supplemental Analyses

In the following paragraphs, we present results of supplementary analyses that build on the above Table 2 (Column D) finding that governance is associated with MW under the Section 404 regime. First, we further examine the roles of accounting and supervisory experts in ICFR effectiveness by investigating whether MW more related to each type of expertise are less likely when individuals with relevant qualifications are represented on the audit committee. Second, we provide some (albeit limited) evidence of causal direction of the detected associations, through use of a lag analysis. Third, recognizing that the selection of certain types of individuals on the audit committee is likely not random, we assess the sensitivity of our results to use of a Heckman maximum likelihood selection bias model.

First, results of Table 2 show that for accelerated filers using Section 404 data, audit committees with higher *PAFE* and *PSFE* are associated with effective internal controls. To further examine the roles of specific kinds of financial expertise in this sample, we separate Section 404 MW into two categories, relating specifically to: (1) financial statement accounts (termed *ACCT-MW*, 216 companies); and (2) personnel and information technology, e.g., segregation of duties, ethical problems, issues with senior management, and insufficient training and resources (termed *PERSONNEL&IT-MW*, 76 companies).[25] We expect that AFEs are more likely to contribute to internal controls relating to accounting matters. With regard to general management issues such as personnel and information technology, the relative contribution of AFEs and SFEs is less clear. For instance, some personnel/IT

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[24] The composite board score is not significant in any of these regressions.

[25] If a firm has both *ACCT-MW* and *PERSONNEL&IT-MW*, we gave precedence to *ACCT-MW*. There are 116 accelerated filers with MW that do not fall into either category. These companies are excluded from this analysis. Consistent with results of Table 2, we do not find the expected association of financial expertise with *ACCT-MW* or *PERSONNEL&IT-MW* with Section 302 MW disclosures among either accelerated or non-accelerated filers.

TABLE 3
Logistic Regressions of Material Weakness on Governance and Control Variables for the Larger Non-Accelerated Filers and Smaller Accelerated Filers

		A. Upper Non-Accelerated Size Quintile (302)	B. Lower Accelerated-404 Size Quintile	C. Lower Accelerated-302 Size Quintile
Variable	Predicted Sign	Coefficient (Wald Chi-Square)	Coefficient (Wald Chi-Square)	Coefficient (Wald Chi-Square)
Intercept		−1.788 (0.980)	−2.288 (8.125***)	−5.601 (6.012**)
PAFE	−	−0.275 (0.043)	−1.476 (6.463***)	−0.329 (0.045)
PSFE	−	−0.197 (0.047)	−0.776 (3.149**)	1.086 (0.801)
AUDITMEETING	?	0.101 (1.484)	0.079 (6.306**)	0.166 (3.329*)
AUDITCOMMITTEESIZE	−	0.201 (0.138)	0.318 (1.945)	0.506 (0.628)
BOARD-STRENGTH	−	−0.347 (1.748)	0.065 (0.339)	0.037 (0.015)
LOGMARKETCAP	−	−0.383 (1.704)	−0.093 (0.506)	−0.249 (0.417)
LOSS	+	1.377 (6.892***)	0.871 (10.866***)	0.957 (1.784*)
SEGMENT	+	0.061 (0.761)	0.058 (3.2857**)	0.096 (1.429)
FOREIGN	+	−0.090 (0.016)	0.15 (0.290)	1.367 (4.507**)
MERGER	+	−0.067 (0.008)	0.370 (1.472)	1.107 (2.594*)
RESTRUCTURE	+	0.475 (0.403)	0.498 (3.446**)	−0.702 (0.808)
EXTREMEGROWTH	+	−0.682 (0.877)	−0.177 (0.299)	0.773 (1.228)
BIG4	+	0.596 (0.998)	0.050 (0.023)	−1.177 (2.389)
MIDTIER	+	0.037 (0.001)	0.907 (5.752***)	0.127 (0.022)
AUDITORCHANGE	+	0.856 (1.930*)	0.135 (0.156)	−0.212 (0.066)
LITIGATION	+	−0.152 (0.077)	−0.630 (4.773**)	−0.672 (0.826)
FY2005	?	0.346 (0.308)	−0.527 (4.663**)	−0.013 (0.000)
Nagelkerke R^2		0.193	0.148	0.203
Sample Size		234	747	669
# of Companies with Material Weakness		21	113	14

(*continued on next page*)

TABLE 3 (continued)

*, **, *** Indicate significant effects with probability levels one-tailed for directional expectations at the < 0.10, < 0.05, and < 0.01 levels, respectively.

The table presents results for estimating the likelihood of disclosing MW.

Column A presents results for the largest 20 percent non-accelerated filers.

Columns B and C include only the smallest 20 percent accelerated filers, separating reported MW by regulatory regime: Column B uses MW reported under Section 404, while Column C uses MW reported under Section 302.

Variables are defined in Table 1.

problems (e.g., ethical and senior management concerns) have been associated with financial statement fraud. CEOs, COOs, and board chairs may have greater liability concerns due to their personal wealth (Black et al. 2005), and thus be more attentive toward those issues. Also, they might be more likely to get involved in personnel issues and high-level technology decisions involving a large commitment of financial resources. However, these weaknesses in controls over financial reporting may relate to lower levels of personnel and details of technology implementation such as system security, which are more the province of accounting experts. Estimating the logistic regression model with the dependent variable *ACCT-MW*, we find (results not tabled) that *PAFE* is associated with reduced likelihood of disclosing accounting-related Section 404 MW ($p < 0.01$), but *PSFE* is not significant. In contrast, when the dependent variable is *PERSONNEL&IT-MW* we find that *PSFE* is associated with reduced likelihood of disclosing these MW ($p < 0.10$), but *PAFE* is not. While these results reinforce the view in many SEC comment letters that both types of expertise might contribute, accounting qualifications matter more for MW that directly affect the financial statements in the near term. This may explain why studies of discretionary accruals such as Dhaliwal et al. (2007) fail to find significant associations with supervisory expertise.[26]

In our second supplemental analysis, we address the issue of endogeneity that is common to corporate governance research (e.g., Larcker et al. 2007). We extend our models of contemporaneous association by performing a lag analysis, modeling current year Section 404 MW as a function of the prior-year board and audit committee characteristics. Because our data do not contain governance characteristics for fiscal 2003, we gathered this information from the BoardAnalyst database. This database has sufficient information to construct our governance variables, with the exception of audit committee meetings. Using these data, we are able to match 979 firm-years of the accelerated filers in the complete sample, including 88 companies disclosing Section 404 MW. To validate the composition of the lag subsample, we first test whether our Section 404 results using contemporaneous governance variables hold. We find similar results to those reported in Table 2; specifically, both *PAFE* and *PSFE* are negative and significant ($p < 0.10$), as is the board score ($p < 0.05$). We then estimate the model using the lagged governance variables, with similar results. This analysis provides some evidence that better corporate governance leads to more effective internal control.

Third, we re-estimate our model while controlling for selection bias. As noted by Carcello et al. (2006), a company's selection of audit committee members with certain

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[26] Regarding other governance variables, the *PERSONNEL&IT-MW* model is the only case in which we find audit committee size to be significant; it is positive at $p < 0.05$. In both models, the number of audit committee meetings is positive and significant at $p < 0.01$, and board strength is negative at $p < 0.10$.

qualifications is probably not random. To investigate whether controlling for selection of at least one AFE on the audit committee would affect our results, we estimate Heckman maximum-likelihood probit models for accelerated and non-accelerated filers. Building on the model presented by Carcello et al. (2006), our selection model contains variables indicating agency cost (company size, institutional ownership and leverage), complexity (foreign operations, recent merger, number of segments, recent new financing), financial risk (going-concern audit opinion, loss, return on assets, extreme sales growth), governance (audit committee meetings and our summary board score), and Big 4 auditor. We expect a positive association of AFE with company complexity, but as noted by Carcello et al. (2006), the likely signs of the remaining constructs are difficult to predict. We find (results not tabled) that in the Section 404 MW model, the likelihood ratio test of independence of equations does not reject the null hypothesis of no selection bias. Further, we continue to observe a negative association between *PAFE* and *PSFE* and MW disclosure ($p < 0.05$ and $p < 0.10$, respectively).

Models of Board Choice in Designating Financial Experts

Our previous analysis shows that audit committee composition matters among accelerated filers in the Section 404 regime. Essentially, that analysis considers the qualifications of all individuals with a seat at the table. While the SEC initially considered requiring disclosures of qualifications on all audit committee members, the final policy that implements Section 407 of SOX requires identification of at least one individual audit committee member as the "designated" financial expert (or an explanation as to why no one is so designated). We now build on the Table 2 analysis by focusing on Section 407 designations, to determine whether financial experts (as determined by qualifications) have the same negative association with MW, whether their companies designate them as Section 407 financial experts.[27] Presumably, if companies designate the most highly qualified individuals as financial experts, we should observe a negative association of MW with higher proportions of individuals in the designated group, but less (or no) association with individuals not designated. However, as noted by Carcello et al. (2006), some individuals may seek to avoid being designated out of concern for additional litigation exposure. If more qualified individuals prefer not to be designated, this decreases the likelihood of finding an association of MW among the designated group. As noted in the Method section, we investigate this issue using a subset of our original sample (2,391 accelerated filers with 275 Section 404 MW disclosures).

Prior to estimating the model in the subsample, we present descriptive statistics comparing qualifications to designation. Of the 8,424 audit committee members in this subsample, 3,495 (41.4 percent) are designated as financial experts. Of the 2,391 companies, 687 companies (29 percent) designate more than one financial expert. (In fact, 13 percent designate more than two financial experts.) Subsample data show that boards often have a choice of which type of expert to designate. Of the audit committee members that are designated, 33.7 percent are accounting financial experts, 42.8 percent are supervisory, and 23.7 percent are users. Interestingly, out of the total number of audit committee members with supervisory expertise, 60 percent are not designated, but only 27 percent of audit committee members having accounting qualifications are not designated as financial experts.

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[27] Because our data capture both audit committee composition and designation, we are able to compare results both to studies that examine only composition (Zhang et al. 2007) and others that concentrate on designation (Carcello et al. 2008).

This implies that when accounting experts are on the audit committee, they are often designated, but a significant proportion of individuals with supervisory expert qualifications are less likely to be identified as financial experts in corporate proxy statements.

To investigate the role of designated and non-designated financial experts in ICFR effectiveness, we first replicate the Table 2 (Column D) model in the designation subsample, finding that results for all corporate governance variables are replicated in this reduced data set. Next, we split both the accounting and supervisory experts of accelerated filer companies into two groups (designated and non-designated), creating four mutually exclusive financial expertise proportion variables for the Section 404 MW disclosure model: *PAFE-DES* and *PAFE-NOTDES* (indicating proportions of audit committee members with accounting qualifications who are, or are not, designated as financial experts, respectively). *PSFE-DES* and *PSFE-NOTDES* are similarly constructed from supervisory financial expert data. Table 4 shows that the coefficients on *PAFE-DES* and *PAFE-NOTDES* are both significant ($p < 0.05$), implying that accounting financial experts play a role in ICFR effectiveness, whether designated or not. Considering supervisory expertise, we find that *PSFE-NOTDES* is negative and significant ($p < 0.05$), while *PSFE-DES* is not. These results are contrary to the notion that the supervisory experts most likely to contribute to ICFR effectiveness are those that are designated.

Thus far, our analysis has focused on accounting and supervisory expertise. As previously noted, we were unable to accurately parse biographical information in the SEC's third (user) category due to the diversity of allowed qualifications. However, focusing on designation decisions in this subsample allows us to consider user financial experts, because SEC rules allow companies to designate only individuals with qualifications in one of the three categories. Thus, a designated expert who does not have AFE or SFE qualifications must, by default, have UFE qualifications. We next assess companies' decisions to designate an individual in one of the three expertise categories, and to designate multiple individuals as financial experts.[28]

To model these choices, we include companies designating a single accounting expert in the intercept (thus comparing MW disclosure of other companies to this baseline), for two reasons. First, the SEC originally preferred financial experts with accounting backgrounds. Second, prior research consistently finds that accounting financial experts are associated with higher financial reporting quality, while prior studies separating supervisor and user financial experts are few, and their results more variable. We expect positive coefficients on the designation indicators in this model: companies designating a single individual with supervisory expertise (*SFE-DES*) or user expertise (*UFE-DES*), or designating multiple financial experts (*MULT-DES*). Results in Table 5 show positive and significant coefficients on designation of user financial experts, as well as on multiple financial experts ($p < 0.05$). In addition, the coefficient on designating supervisory financial experts is positive and marginally significant ($p < 0.10$). These results imply that companies designating only one accounting expert are more likely to have effective controls than companies using the other designation strategies measured.

V. SUMMARY AND CONCLUSIONS

In this study, we examine the association of corporate governance with public disclosure of material weaknesses (MW) in internal controls over financial reporting (ICFR), as a

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[28] As noted by Carcello et al. (2006), the decision to designate multiple financial experts is interesting, as it suggests that boards are seeking to diffuse the financial expert's responsibility (and corresponding liability) among multiple audit committee members.

TABLE 4
Logistic Regression of Material Weakness, Separating Designated from Non-Designated Accounting and Supervisory Experts

Variable	Predicted Sign	Coefficient	Wald Chi-Square
Intercept		−1.301	8.086***
PAFE-DES	−	−0.810	4.457**
PAFE-NOTDES	−	−1.227	4.212**
PSFE-DES	−	−0.308	0.734
PSFE-NOTDES	−	−0.664	4.638**
AUDITMEETING	?	0.087	23.901***
AUDITCOMMITTEESIZE	−	0.046	0.106
BOARD-STRENGTH	−	−0.125	3.290**
LOGMARKETCAP	−	−0.238	18.939***
LOSS	+	0.510	10.656***
SEGMENT	+	0.046	9.382***
FOREIGN	+	0.268	3.140**
MERGER	+	0.047	0.090
RESTRUCTURE	+	0.145	0.803
EXTREMEGROWTH	+	−0.230	1.563
BIG4	+	0.238	0.604
MIDTIER	+	0.733	4.278**
AUDITORCHANGE	+	0.462	3.934**
LITIGATION	+	0.152	0.841
FY2005	?	−0.253	2.820*
Nagelkerke R^2		0.101	
Sample Size		2,391	
# of Companies with Material Weakness		275	

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*, **, *** Indicate significant effects with probability levels one-tailed for directional expectations at the < 0.10, < 0.05, and < 0.01 levels, respectively.

The table presents results for estimating the likelihood of disclosing MW with accounting and supervisory financial experts on the audit committee, which are or are not publicly designated as a "Section 407 financial expert" by their companies. The analysis includes only Section 404 accelerated filers.

Variables are defined in Table 1.

measure of quality of corporate systems that generate financial reports. We estimate separate models using MW disclosed under regulations arising from Sections 302 and 404 of the Sarbanes-Oxley Act, in order to address differences in associations of governance characteristics and internal control quality in these regulatory regimes. We investigate these issues using logistic regression models for which the dependent variable is disclosure of MW in ICFR, with independent variables including corporate governance characteristics and controls. Our sample comprises 5,480 firm-year observations companies and over 19,000 audit committee members, obtained through computerized parsing of data from AuditAnalytics. This method contributes to the literature in demonstrating a means of efficiently capturing data on audit committee qualifications, enabling a larger sample more representative of the broad market. We present a number of findings that contribute to knowledge regarding the role of corporate governance and other company characteristics in affecting internal controls.

TABLE 5
Logistic Regression of Material Weakness, Comparing Designation of Accounting Financial Experts with Companies' Other Designation Choices

Variable	Predicted Sign	Coefficient	Wald Chi-Square
Intercept		−1.795	15.329***
SFE-DES	+	0.308	2.511*
UFE-DES	+	0.408	4.436**
MULT-DES	?	0.387	5.082**
AUDITMEETING	?	0.082	22.035***
AUDITCOMMITTEESIZE	−	0.017	0.015
BOARD-STRENGTH	−	−0.113	2.705**
LOGMARKETCAP	−	−0.247	20.383***
LOSS	+	0.471	9.206***
SEGMENT	+	0.042	7.850***
FOREIGN	+	0.270	3.174**
MERGER	+	0.053	0.113
RESTRUCTURE	+	0.131	0.664
EXTREMEGROWTH	+	−0.226	1.513
BIG4	+	0.196	0.412
MIDTIER	+	0.704	3.941**
AUDITORCHANGE	+	0.441	3.580**
LITIGATION	+	0.129	0.613
FY2005	?	−0.278	3.417*
Nagelkerke R^2		0.099	
Sample Size		2,391	
# of Companies with Material Weakness		275	

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*, **, *** Indicate significant effects with probability levels one-tailed for directional expectations at the < 0.10, < 0.05, and < 0.01 levels, respectively.

The table presents results for estimating the likelihood of disclosing MW, comparing the designation of a single accounting financial expert with other designation choices. The analysis includes only Section 404 accelerated filers.

Variables are defined in Table 1.

First, our descriptive statistics show that the rate of MW disclosure among non-accelerated filers under Section 302 is substantially lower than that of companies reporting under Section 404. The lower rate of reported MW among non-accelerated filers in our sample implies that disclosure of MW is less complete under Section 302 than Section 404. While we find significant associations with various company characteristics under both regimes, the non-accelerated filer model (using Section 302 data) fails to show the expected negative associations of corporate governance quality (audit committee financial expertise and overall board quality) with MW disclosure that are evident among accelerated filers. Further, when the MW disclosures for accelerated filers derived from Sections 404 and 302 are modeled separately, we find that corporate governance measures are significant only for Section 404 disclosures. Taken together, these results suggest that higher quality corporate governance is associated with more effective internal controls (and/or with remediation of detected MW prior to the required disclosure date), but that this association is only detectable under Section 404. In other words, companies with weaker governance environments are not detecting or disclosing their MW under Section 302, without Section 404's mandatory testing and the threat of an adverse auditor's opinion. This finding is important because prior research has not separately analyzed MW disclosure by internal control regime. However, the findings of Bedard and Graham (2008) provide further evidence that detection of internal control weaknesses by management is insufficient. In the Section 404 environment (in which management is required not only to document controls, but also to test them), they find that 84 percent of MW are detected by auditors. Their findings underscore the conclusion of the current study that auditor involvement is crucial to identifying and improving ICFR.

Our results on audit committee financial expertise also help reconcile disparate findings of prior research. As previously noted, studies generally find (as do we) that accounting financial expertise on the audit committee is positively associated with the quality of financial reporting or internal controls over the financial reporting function (e.g., DeFond et al. 2005; Carcello et al. 2008; Zhang et al. 2007). However, results of prior research vary on financial experts with the supervisory and user qualifications also allowed by the SEC. Individuals with these types of expertise bring different knowledge to bear on the task. Particularly, supervisory expertise is based on a more internal focus, while user expertise is based on a more external focus. Few studies separate these categories, and those that do use accruals quality as the financial reporting measure (Xie et al. 2003; Dhaliwal et al. 2007; Carcello et al. 2008). Xie et al. (2003) and Carcello et al. (2008) find that user experience is associated with higher accruals quality, but only Xie et al. (2003) find significant results for supervisory experience, and their measure is confined to outside corporate directors. Rather than a financial reporting *outcome* measure, our dependent variable is a financial reporting *process* measure. We find that both accounting and supervisory expertise are associated with higher quality internal controls in the Section 404 environment. We find that accounting experts are associated with better controls over processes directly related to the financial reports, while supervisory experts are associated with better controls over management processes (e.g., personnel competence). Thus, our results suggest that only accounting experts are associated with effectiveness of controls directly associated with current financial statement line items, consistent with other studies finding that these financial experts are associated with higher accrual quality. Our finding that supervisory financial experts are associated with higher quality of internal controls in personnel and information technology issues, but not those directly related to financial statements, is consistent with studies finding no association of supervisor expertise with accruals quality (e.g., Dhaliwal et al. 2007; Carcello et al. 2008). However, our result that boards choosing to designate user financial experts are more likely to report MW than those designating accounting financial experts is not consistent with these studies.

This study also provides other findings that contribute to the literature on corporate governance and financial reporting. For instance, we find a positive association between the number of audit committee meetings and MW, using both Section 302 and Section 404 data. This contradicts prior findings that less frequent meetings are associated with negative outcomes (McMullen and Raghunandan 1996; Beasley et al. 2000; Farber 2006; Archambeault and DeZoort 2001). In the MW context, more frequent audit committee meetings may be in reaction to the discovery of problems in internal controls, rather than increased diligence *causing* better control over financial reporting. We also find that audit committee size is not associated with MW disclosure, either for accelerated or non-accelerated filers. Finally, we observe that companies that designate multiple financial experts have higher likelihood of disclosing MW. This could suggest an attempt by companies with MW to signal that their audit committees are equipped to overcome their internal controls flaws. Alternatively, the absence of safe harbor from liability (as recently decided by the SEC) might cause boards of problem companies to designate more than one accounting financial expert (AFE) to spread the liability (as suggested by Carcello et al. 2006).

We note several limitations of our analysis. First, we assess the association of governance metrics with internal control MW in the first two fiscal years following implementation of Section 404 (i.e., through mid-2006). Further research should investigate this important issue in subsequent periods, as companies adapt their governance structures to the changing regulatory climate. Particularly, if the SEC holds to its current course of expanding Section 404 auditor testing to all public companies, research should investigate the role of governance in internal controls as the non-accelerated filers become subject to those regulations. Second, the cross-sectional approach used in this study is subject to the endogeneity problem often acknowledged in corporate governance research (e.g., Larcker et al. 2007, 1003). We address this issue by using both a lag analysis and a Heckman selection bias model, and find that our results continue to hold.

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Board Committees, CEO Compensation, and Earnings Management

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ABSTRACT: We analyze the board of directors' equilibrium strategies for setting CEO incentive pay and overseeing financial reporting and their effects on the level of earnings management. We show that an increase in CEO equity incentives does not necessarily increase earnings management because directors adjust their oversight effort in response to a change in CEO incentives. If the board's responsibilities for setting CEO pay and monitoring are separated through the formation of committees, then the compensation committee will increase the use of stock-based CEO pay, as the increased cost of oversight is borne by the audit committee. Our model generates predictions relating the board committee structure to the pay-performance sensitivity of CEO compensation, the quality of board oversight, and the level of earnings management.

Keywords: *corporate governance; executive compensation; earnings management; board oversight.*

I. INTRODUCTION

There is a widespread concern that the surge in CEO pay and recent spectacular cases of accounting fraud reflect a failure of corporate governance. A better understanding of the relation between corporate governance, CEO pay, and earnings manipulation is of great interest to both empirical and theoretical researchers, as well as regulators. A key element in this relation is the role of the board of directors. In order to understand how boards carry out their duties, it is important to recognize that most board functions are performed by committees. As a director interviewed by Lorsch and MacIver (1989, 59)

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remarked: "The work of the board is done in committees" (see also Adams [2003] for further discussion).

Delegating different board functions to different committees implies a separation of tasks and functions on boards. We focus on the two board functions of designing the CEO incentive pay scheme and overseeing the financial reporting process (monitoring) and study how task separation affects corporate governance.

The compensation committee is responsible for setting the pay scheme for the CEO. Due to the prevalence of stock-based executive compensation in corporations (Core et al. 2003), we focus on the share price as a performance measure for executive compensation. Although higher-powered incentive schemes motivate the CEO to take value-enhancing actions, *ceteris paribus*, they may also induce manipulative actions that boost the (short-term) stock price at the expense of long-term shareholder value. We model the interaction between the productive and manipulative activities as a multi-task agency problem in the spirit of Feltham and Xie (1994). In particular, the CEO in our setting has an incentive to distort the earnings report upward in an attempt to mislead investors about future cash flows. Although, as in Stein (1989), investors are not fooled in equilibrium,[1] earnings management is costly to current shareholders because it negatively affects the long-term value of the firm.

One of the main objectives of the audit committee is to detect and prevent earnings management. In particular, the audit committee is responsible for monitoring the integrity of the firm's financial statements and the performance of the internal audit function. The magnitude of earnings management in the firm therefore depends on both the CEO's level of manipulation and the board's level of monitoring. Since an increase in stock-based compensation enhances the CEO's direct incentive to manipulate earnings, the need for board oversight increases with the size of the stock grant. Thus, there is a positive spillover effect of the pay-performance sensitivity of CEO compensation on the audit committee's incentive to engage in monitoring.

We assume that the board of directors is interested in the firm's long-term value. Monitoring is not contractible and not observable, which implies that the board cannot commit to a certain level of oversight. However, the board is able to exploit the spillover effect of CEO compensation to indirectly commit to oversight. That is, by increasing the link between CEO pay and performance, the board can credibly signal to the CEO that it will take its oversight function seriously. This indirect commitment to oversight is beneficial, since it curbs the CEO's incentive to take manipulative actions in the first place.

To discuss the effects of task separation on boards, consider a situation without committees where the whole board is responsible for both setting CEO pay and monitoring. In this case, the board will under-exploit the positive spillover (indirect commitment) effect, because it has to bear the personal cost of subsequent monitoring. That is, the anticipation of burdensome monitoring lowers the board's desire to offer the CEO a powerful incentive pay scheme. In such a situation, it is beneficial for shareholders to form committees and to delegate the task of setting CEO pay to a compensation committee and the oversight task to an audit committee. The formation of committees does not in itself guarantee a clean separation of functions. Since it is not uncommon for board members to sit on more than one committee, task separation on boards not only depends on the presence of committees, but also on the degree of director overlap between the two committees. For this study we define director overlap as the fraction of directors who serve on both committees.

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[1] See also Fudenberg and Tirole (1986) and Holmstrom (1999).

We show that the degree of director overlap determines the extent to which the compensation committee will take advantage of the positive spillover effect of CEO incentive pay on board oversight. If director overlap decreases, i.e., if task separation is higher, then the compensation committee is less involved in the monitoring task and hence less concerned about the cost of monitoring. As a result, the compensation committee will increase the pay-performance sensitivity of CEO compensation in order to induce a higher equilibrium level of monitoring. Our model therefore predicts that an increase in task separation on boards leads to more powerful incentive schemes for the CEO and an increase in board oversight.

In our setting, an increase in stock-based CEO compensation is not necessarily associated with an increase in the level of earnings management. Clearly, a more powerful incentive package increases the CEO's direct incentive to engage in manipulation, but, at the same time, it also increases the audit committee's equilibrium choice of monitoring, which in turn prevents and deters manipulation. Depending on which effect is stronger, the magnitude of earnings management can increase or decrease with the pay-performance sensitivity of the CEO's compensation plan.

We determine the optimal level of task separation on boards from the perspective of shareholders and show that a positive level of task separation is always beneficial regardless of whether this results in more or less earnings management.

In Section II we provide an overview of related studies. Section III introduces the model. In Section IV we consider a benchmark case in which the board's monitoring choice is observable and contractible. In Section V we analyze the equilibrium outcome for our main setting, where monitoring is unobservable. We also show in this section how task separation on boards influences the boards' decision-making, and we determine the optimal degree of task separation from shareholders' perspective. Empirical implications are discussed in Section VI. Section VII concludes. Appendix A provides a table of notation and Appendix B contains the proofs.

II. RELATED STUDIES

There is a growing empirical literature that analyzes the relation between audit committee or board characteristics, such as independence, size, and director background on the one hand, and firm performance, CEO compensation, CEO turnover, and earnings management on the other hand (e.g., Klein 2002; Farber 2005; Larcker et al. 2007; and for a survey, Hermalin and Weisbach 2003). Our paper carves out another channel through which the board structure has an impact: the separation of board functions. Our analysis provides a number of testable predictions relating director overlap to the pay-performance sensitivity of CEO compensation, earnings management, and board oversight.

Theoretical contributions on boards focus mainly on the question of how a change in the board's power or independence affects CEO compensation and turnover (Hermalin and Weisbach 1998; Almazan and Suarez 2003; Hermalin 2005). Adams and Ferreira (2007) analyze the board's two roles of advising and monitoring the CEO. They show that if both functions are performed by the same group of directors, then the CEO is unwilling to reveal information that helps directors to provide advice, since directors can also use the information for monitoring purposes. A separation of functions is beneficial because it serves as a substitute for a commitment not to use the revealed information against the CEO. In contrast, in our setting, the separation of functions changes how the compensation committee accounts for the cost of monitoring when choosing the pay-performance sensitivity of the CEO's compensation contract. With separated responsibilities, the compensation committee is more willing to provide strong incentives to the CEO, which puts the audit committee under greater pressure to diligently perform the oversight task.

Our paper is also related to the growing literature on earnings management (e.g., Fischer and Verrecchia 2000; Ewert and Wagenhofer 2005; Goldman and Slezak 2006). Goldman and Slezak (2006) show that linking pay to the firm's share price provides the CEO with incentives to manipulate accounting information. They analyze how an exogenous change in the level of monitoring influences the equilibrium levels of the pay-performance sensitivity and manipulation. In contrast, in our setting, the audit committee's level of oversight is endogenous and unobservable, which creates a commitment problem with respect to monitoring. We show that the board is able to exploit the pay-performance sensitivity of CEO pay to indirectly commit to monitoring and analyze how the separation of tasks on the board affects the extent to which the board will make use of this commitment device. Goldman and Slezak (2006) also discuss the potential effects of recent regulatory changes that require the separation of accounting services from consulting services. They argue that this type of task separation eliminates "easy" ways to manipulate accounting information and thereby makes manipulation more costly for the firm. Thus, in their model task separation is assumed to have a direct effect on the cost of manipulation. In our model, the effect of task separation is more in the spirit of the multi-task agency literature, where the multi-task problem arises not only on the level of the CEO, but also on the board. The board has to perform two functions, and the degree of task separation affects how it performs these tasks. Thereby, task separation has an indirect effect on earnings management.

The interaction between the productive and manipulative activities is related to the multi-task agency literature introduced by Holmstrom and Milgrom (1991), Baker (1992), and Feltham and Xie (1994). They show that the use of imperfect performance measures can lead to distorted incentives in the sense that the agent allocates his effort inefficiently among different tasks. In such a case, it can be optimal to employ a low-powered incentive scheme in order to limit dysfunctional behavior. We extend this literature by introducing endogenous monitoring by the board, which is assumed to reduce the agent's ability to "game" the performance measure. Hence, in our setting the amount of effort distortion is a function of the audit committee's equilibrium choice of monitoring, which in turn depends on the pay-performance sensitivity of CEO pay. This modeling feature leads to a number of new results. For example, if the effort distortion becomes more costly to the firm (i.e., the direct cost of earnings management to the firm increases), then the board does not necessarily respond to this change by reducing the pay-performance sensitivity. Instead, it may actually increase CEO incentives in order to induce a greater equilibrium level of monitoring that prevents and deters earnings manipulation.

III. THE MODEL

Model Stages

Stage 1

In the first stage, the firm is established, and shareholders hire a CEO to run the firm. Shareholders also employ a board of directors and decide on how the board will be organized. The board of directors has to perform the two functions of setting CEO pay and overseeing the financial reporting process. These functions can be delegated to the compensation committee and the audit committee. The formation and the composition of these committees is commonly observable.

To ensure their participation, directors obtain a fixed salary for their services on the board, w_B. We normalize directors' personal costs of sitting on the compensation committee to be zero, but performing the oversight function on the audit committee involves a personal cost. Therefore, audit committee members must receive an additional compensation, which we denote by w_A.[2]

Stage 2

The compensation committee designs the incentive pay scheme for the CEO. In general, the committee has several alternatives, e.g., it can use linear or nonlinear contracts and choose between different performance measures. For the purposes of this paper, these differences are not essential. Since empirical evidence suggests that stock-based compensation is the dominant source of CEOs' direct incentives (Core et al. 2003), we focus on executive stock plans as an incentive tool. The compensation committee specifies the number of shares awarded to the CEO, denoted b, and a fixed salary, denoted w_C. We also refer to b as the pay-performance sensitivity of the CEO's compensation scheme. The board's choice of the pay parameters, w_C and b, is publicly observable.

There are two ways to award the CEO the shares: the firm can either issue new shares of stock, thereby diluting the claims of current shareholders, or it can use cash to buy the required shares of stock in the open market. Both alternatives yield equivalent results. For ease of exposition, we choose the second alternative.

Stage 3

The CEO chooses a productive effort, a_1, which positively affects future cash flows. If the manager does not engage in earnings manipulation, then the interim earnings report issued in stage 3, R, is an undistorted signal of the firm's long-term cash flow, V, where $R = V = v_1a_1 + \eta$. The factor η is the state of the world, which is normally distributed with mean zero and variance σ^2_η.

Following the earnings management literature (Stein 1989; Feltham and Xie 1994; Goldman and Slezak 2006), we assume that the CEO sells his stock prior to the realization of the terminal firm value (stage 4). This creates an incentive for the CEO to manipulate the interim earnings report R at the expense of long-term firm value, V. The task of the audit committee is to oversee the financial reporting process in order to reduce the magnitude of earnings management. The level of oversight reflects the time and attention that the audit committee devotes to its duties, such as preparing for meetings with management, engaging in vigorous debate, and asking probing questions. Thus, the amount of realized earnings management, $M(a_2, e)$, is a function of both the CEO's manipulation activity, a_2, and the board's monitoring effort, e, with $\partial M/\partial a_2 > 0$ and $\partial M/\partial e < 0$. For a given level of earnings management, the report in stage 3 is given by $R = v_1a_1 + mM + \eta$ with $m > 0$ and the long term-firm value is $V = v_1a_1 - v_2M + \eta$, with $v_2 > 0$.

Earnings management has a negative effect on firm value for various reasons. Examples include costs for the firm due to reputation loss, legal liability, earnings restatements, or increases in audit fees and D&O insurance premiums. By analyzing and discussing the firm's financial and pro forma statements, the audit committee is able to detect and prevent manipulation attempts early, which positively affects firm value. In addition, firm employees may receive bonus payments that depend on the earnings report, the stock price, or both. In this case, a higher level of oversight reduces the firm's wage cost. Moreover, manipulation may lead to distortions in the firm's operating and investment decisions. Graham et al. (2005) find strong evidence that managers engage in real earnings management, which includes reducing discretionary spending on R&D, advertising, and maintenance, and postponing positive net present value investments at the expense of long-term firm value. Again, an attentive board should be better able to restrict management from undertaking or continuing real activities that are aimed at manipulating the report.

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[2] A review of the 2006 Spencer Stuart Board Index shows that it is not uncommon for committee members to receive retainers, and that the levels of these retainers differ depending on the type of the committee. (See http://content.spencerstuart.com/sswebsite/pdf/lib/SSBI-2006.pdf)

We normalize the monitoring effort to take values between 0 and 1, $e \in [0,1]$, and assume that $M = (1 - e)a_2$. To guarantee a concave optimization problem and to focus on interior solutions with a strictly positive pay-performance sensitivity, we assume that earnings management has a relatively low impact on the report relative to the productive act, i.e., m is relatively small compared to v_1.

The activities a_1, a_2, and e are not observable. Directors' personal cost of performing the minimum level of oversight, $e = 0$, and the personal cost of setting CEO compensation are normalized to 0. Choosing an oversight effort above the minimum level involves a private cost, $c(e) = 0.5k_e e^2$, with k_e sufficiently high to induce interior solutions. The CEO's private cost of undertaking the activity a_i is $c(a_i) = 0.5k_i a_i^2$, for $i = 1, 2$. $c(a_1)$ is the standard effort cost (or, equivalently, reduced private benefits). The cost of manipulation, $c(a_2)$, may stem from litigation, reputation, or psychic costs.

Stage 4

The firm realizes its long-term cash flow, V. Shareholders' net payoff is the cash flow V net of expected compensation for the CEO and the board. The terminal net firm value is therefore given by $V^{net} \equiv V - w_C - bS_2 - w_B - w_A$, where S_2 is the stock price in stage 2, bS_2 is firm's cost of buying the shares that are granted to the CEO in stage 2, w_B is the board members' base wage, and w_A is the retainer for members of the audit committee.

Shareholders' Preferences and Interim Stock Prices

We assume that shareholders and potential investors are risk-neutral and that the risk-free rate is 0. The number of shares is normalized to 1. In equilibrium, the share price in stage 2 equals the expected net terminal value, i.e., $S_2 = E[V^{net}] = E[S_3(R)]$.

In stage 3, shareholders observe the earnings report R. The stage 3 stock price S_3 equals the expected net firm value, given the report R, and the investors' conjectures about the level of earnings management, denoted $\hat{M}$. We obtain $S_3 = E[V^{net}|R, \hat{M}]$, with $E[V^{net}|R, \hat{M}] = (R - m\hat{M} - v_2\hat{M} - w_C - bS_2 - w_B - w_A)$. We assume that investors know the parameters of the model and hold rational expectations. Investors correctly anticipate the CEO's incentive to bias the earnings report and the audit committee's incentive to engage in monitoring. In equilibrium, those expectations are met, i.e., $\hat{M} = M^*$, where M^* is the equilibrium level of earnings management.

CEO Preferences

We assume the CEO can sell his stock in stage 3 at the price S_3, which leads to a compensation of $w_C + bS_3$.[3] The CEO is risk-averse with CARA utility function $u(y) = -\exp[-ry]$, where y is his compensation minus personal cost of effort, and r is his risk-aversion coefficient. The goal of the CEO is to maximize his expected utility, which is equivalent to maximizing the certainty equivalent:

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[3] Of course, this is a simplifying assumption. In practice, legal or contractual constraints may prohibit the CEO from unloading all his shares at the same time. In this case, the CEO's ability to benefit from earnings management is lower.

$$CE = w_C + bE[S_3(R)] - 0.5k_1a_1^2 - 0.5k_2a_2^2 - 0.5rb^2\sigma_\eta^2. \tag{1}$$

The CEO's reservation certainty equivalent is zero.

Board Preferences and Structure

To model the preferences of the risk-neutral board, we follow the approach in Hermalin and Weisbach (1998), Hermalin (2005), and Adams and Ferreira (2007). The preferences of individual committee members can be aggregated so that a committee acts as if it were a single player with a utility function that puts a positive weight, β, on the expected terminal net value of the firm, $E[V^{net}]$, and a negative weight on monitoring effort. The audit committee's utility function can be stated as:

$$U_{AC} = \beta E[V^{net}] + w_B + w_A - 0.5k_e e^2. \tag{2}$$

As in Hermalin (2005), β is exogenously given and depends on directors' long-term stakes in the firm, the concern for public opinion, and reputation. The assumption that the audit committee cares only about the long-term firm value is stronger than we need. Instead, we could assume that the audit committee is also interested in the intermediate share price, for example, because it wants to sell some of its shares in the short-run. As long as the audit committee's interest in the intermediate share price is not too large relative to its interest in the firm's long-run perspective, the level of board oversight will be positive and our qualitative results continue to hold.

The preferences of the compensation committee are more intricate. First, compensation committee members who also sit on the audit committee have the same preferences as above, $\beta E[V^{net}] + w_B + w_A - 0.5k_e e^2$. Second, directors who only sit on the compensation committee do not incur a personal cost of monitoring and do not receive the retainer w_A. Their preferences are given by $\beta E[V^{net}] + w_B$. We introduce $\gamma \in [0,1]$ (respectively $(1 - \gamma)$) to measure the weight that the first (respectively the second) group gains in the compensation committee's decision process and assume that decisions in the compensation committee are made to maximize the following (mixed) preferences of its members:

$$\begin{aligned} U_{CC}(\gamma) &= \gamma(\beta E[V^{net}] + w_B + w_A - 0.5k_e e^2) + (1 - \gamma)(\beta E[V^{net}] + w_B) \\ &= \beta E[V^{net}] + w_B + \gamma(w_A - 0.5k_e e^2). \end{aligned} \tag{3}$$

If $\gamma = 1$, then tasks are not separated: the two committees comprise exactly the same directors, and the preferences of the compensation committee coincide with the preferences of the audit committee. This case also captures the board's decision making when there are no committees. In contrast, for $\gamma = 0$, task separation is at its maximum: the two committees are composed of different directors, and the compensation committee fully ignores the cost of monitoring when choosing the CEO's incentive contract.

In general, we expect γ to be positively related to the fraction of directors on the compensation committee who also sit on the audit committee. Moreover, γ also depends on the relative importance of the individual board members who serve on both committees. For example, if the chair of the compensation committee also sits on the audit committee, then we would expect a greater impact on γ than if a "regular" director is serving on both committees. For convenience, we refer to γ as director overlap. A lower director overlap implies that the compensation committee is less involved in the oversight function of the audit committee, which reflects situations where the level of task separation is greater.

Board members are willing to serve on the audit committee if they get compensated for the expected cost of monitoring; that is, $w^*_A = 0.5ke^{*2}$, where e^* is the equilibrium effort level. The base salary w_B paid to all directors depends on the directors' expected utility if they do not serve on the board. If, for example, $\beta E[V^{net}]$ represents private benefits of control that are only available to board members, then directors are willing to "pay" for the privilege to sit on the board. In this case, the expected private benefit can be extracted by choosing $w_B = -\beta E[V^{net}]$. Alternatively, we can assume that board members are long-term investors who are holding a share of β in the firm independent of whether they sit on the board; if they do not sit on the board, then another long-term investor with the same share in the firm will. In this case, the participation constraint is binding for $w_B = 0$. Since our qualitative results do not depend on the level of board compensation, we assume for simplicity that $w_B = 0$.

IV. BENCHMARK: COMMITMENT TO MONITORING

In this section, we examine a benchmark setting in which the audit committee's monitoring activity is observable and contractible. Shareholders are therefore able to write a contract with the audit committee in stage 1 that determines not only the salary w_A, but also the level of monitoring. We assume that the level of monitoring cannot be renegotiated at a later stage, i.e., full commitment is possible.

We solve the model backward and first analyze the CEO's optimal action choices in stage 3, given the incentive pay parameters w_C and b and the committed level of monitoring, e.

Definition: An equilibrium consists of action choices for the CEO, (a_1^*, a_2^*), and a pricing function for the market, $S_3(R)$, that satisfy:

(i) Given $S_3(R)$, the CEO's optimal action choices (a_1^*, a_2^*) solve:

$$\max_{a_1,\, a_2} w_C + bE[S_3(R)] - 0.5k_1a_1^2 - 0.5k_2a_2^2 - 0.5rb^2\sigma_\eta^2; \tag{4}$$

(ii) Investors have rational expectations about the CEO's action choices:

$$S_3(R) = R - m(1 - e)a_2^* - v_2(1 - e)a_2^* - w_C - bS_2 - w_A. \tag{5}$$

The action choices for the CEO and the pricing function for the market are mutually consistent. Investors correctly anticipate the CEO's equilibrium level of manipulation and the CEO understands the effect of the earnings report on the stock price.

Lemma 1: The CEO's equilibrium action choices are given by:

$$a_1^* = \frac{v_1}{k_1} b, \tag{6}$$

$$a_2^* = \frac{m(1 - e)}{k_2} b. \tag{7}$$

The CEO engages in earnings manipulation in an attempt to distort the investors' perception about future cash flows. However, in equilibrium, investors correctly anticipate the

CEO's incentive to manipulate and perfectly back out the bias in the report. Hence, similar to Stein (1989), the CEO is "trapped" into manipulating the report in an attempt to distort investors' belief even though nobody is fooled.

The CEO's incentive to deliver productive effort and his incentive to manipulate the report both increase with the pay-performance sensitivity, b. Keeping the level of b fixed, the CEO's incentive to manipulate decreases if the board commits to a higher level of oversight.

In stage 2, the compensation committee sets the pay parameters w_C and b, taking into account the effects of b on effort and manipulation. The compensation committee solves:

$$\max_{b,w_C} \beta E[V^{net}] + \gamma(w_A - 0.5k_e e^2), \tag{8}$$

subject to (6), (7), and the CEO's participation constraint:

$$w_C + bE[S_3(R)] - 0.5k_1a_1^2 - 0.5k_2a_2^2 - 0.5rb^2\sigma_\eta^2 = 0. \tag{9}$$

Observe that there is no conflict of interest between the compensation committee and shareholders, since e and w_A are fixed parameters in stage 2. Hence, the goal of the compensation committee is to maximize $E[V^{net}]$.

Lemma 2: The compensation committee's optimal choice of b is determined by:

$$\frac{v_1^2}{k_1} - v_2\frac{m(1-e)^2}{k_2} - \frac{v_1^2}{k_1}b - \frac{m^2(1-e)^2}{k_2}b - rb\sigma_\eta^2 = 0. \tag{10}$$

The optimal pay-performance sensitivity trades off the benefit of inducing productive effort against the cost of inducing earnings manipulation and the cost of imposing risk on the risk-averse agent. If the marginal productivity of effort, v_1, increases or if the marginal cost of earnings management, v_2, decreases, then the compensation committee will find it optimal to increase b in order to induce greater effort. In addition, when the audit committee is committed to a higher level of oversight, earnings management becomes less of a concern, which, again, makes it optimal to increase the pay-performance sensitivity.

In stage 1, shareholders choose the level of monitoring, e, taking into account its effects on subsequent decisions and activities. The optimal level of monitoring maximizes the expected net terminal firm value, $E[V^{net}]$, subject to the constraints (6), (7), (9), (10), and the audit committee's participation constraint, $w_A = 0.5k_e e^2$. Solving the shareholders' optimization problem leads to the next lemma.[4]

Lemma 3: The optimal choice of e in stage 1 is determined by:

$$2v_2(1-e)\frac{m}{k_2}b^* + \frac{m^2(1-e)}{k_2}b^{*2} = k_e e, \tag{11}$$

where b^* satisfies (10).

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[4] Equivalently, shareholders can delegate the choice of monitoring to the audit committee and compensate it for the cost of monitoring since monitoring is observable and verifiable.

The left-hand side of (11) is the marginal benefit of monitoring, which equals the marginal cost of monitoring, $k_e e$, for the optimal monitoring level. Monitoring has both a direct and an indirect effect on the level of earnings management, $M(e,a_2)$. The direct effect follows because board oversight helps to prevent earnings management; the indirect effect arises because commitment to better oversight weakens the CEO's incentive to take manipulative activities in the first place. A lower level of a_2 is beneficial not only because it reduces M, but also because the CEO must be compensated for his personal cost of manipulation in order to ensure his participation. This latter effect implies that the cost of CEO compensation decreases if the induced level of a_2 declines. It may come as a surprise that the CEO is compensated for his manipulation activity. However, the CEO's participation constraint is binding. Since the CEO is "trapped" into manipulating the report to satisfy the earnings expectations of the market, he will not participate unless this cost is taken into account when the board sets his pay.

Note that we assume here that the actions a_1 and a_2 are independent from one another. Instead, we could assume a dependency between the two actions in the sense that earnings manipulation distracts the CEO from working on his productive task (Holmstrom and Milgrom 1991). This can be modeled by assuming that the two actions are substitutes in the CEO's cost function, e.g., $c(a_1,a_2) = 0.5k_1a_1^2 + 0.5k_2a_2^2 + k_3a_1a_2$. This cost function implies that spending time on the manipulation task increases the CEO's marginal cost of working on the productive task. In such a situation, an increase in monitoring is not only beneficial because it reduces the magnitude of earnings manipulation, but also because it has a positive spillover effect on the productive action. Intuitively, increasing the level of oversight makes manipulation less attractive and hence steers the CEO's attention to his main job. However, since the introduction of effort substitution does not change our qualitative results, we retain our original assumption that actions are independent.

V. MAIN RESULTS

Equilibrium Outcome

We now examine our original problem where the audit committee's choice of monitoring is unobservable. In this case, it is not possible to commit to a specific level of monitoring. The analysis proceeds as follows. In this subsection we analyze how the lack of commitment changes the equilibrium results. In the next subsection we discuss the impact of a change in director overlap on the equilibrium outcome of the game and derive the optimal level of director overlap from the shareholders' perspective.

We begin by analyzing the choice of activities in stage 3, given the compensation parameters w_C and b. Since a_1, a_2, and e are unobservable, we assume without loss of generality that they are chosen simultaneously.

Definition: An equilibrium consists of action choices for the CEO, (a_1^*, a_2^*), an action choice for the audit committee, e^*, and a pricing function for the market, $S_3(R)$, that satisfy:

(i) Given $S_3(R)$ and e^*, the CEO's optimal action choices (a_1^*, a_2^*) solve:

$$\max_{a_1,a_2} w_C + bE[S_3(R(a_1, a_2, e^*))] - 0.5k_1a_1^2 - 0.5k_2a_2^2 - 0.5rb^2\sigma_\eta^2, \tag{12}$$

(ii) Given $S_3(R)$ and (a_1^*, a_2^*), the audit committee's optimal action choice e^* solves:

$$\max_{e} \beta[v_1 a_1^* - v_2(1 - e)a_2^* - w_C - bS_2 - w_A] + [w_A - 0.5k_e e^2], \tag{13}$$

(iii) $S_3(R) = R - m(1 - e^*)a_2^* - v_2(1 - e^*)a_2^* - w_C - bS_2 - w_A$.

In equilibrium, each party correctly anticipates the other party's actions. That is, a_1^*, a_2^*, and e^* are best responses.

Lemma 4: The equilibrium strategies a_1^*, a_2^*, and e^* are determined by the following first-order conditions:

$$a_1^* = \frac{v_1}{k_1} b, \tag{14}$$

$$a_2^* = \frac{m(1 - e^*)}{k_2} b, \tag{15}$$

$$e^* = \frac{\beta v_2 a_2^*}{k_e}. \tag{16}$$

The CEO's first-order conditions (14) and (15) are akin to those with commitment in the benchmark case. However, with unobservable monitoring, the CEO bases his manipulation choice on the conjectured equilibrium level of monitoring rather than the actual level of monitoring. Hence, the audit committee is unable to directly affect the CEO's manipulation incentive through its actual choice of monitoring. Oversight of financial reporting is nevertheless valuable because, for a given level of CEO incentives, more diligent monitoring helps to prevent earnings management. Since the audit committee puts a weight of β on the net terminal firm value, the audit committee's marginal benefit of monitoring is $\beta v_2 a_2^*$.

It is instructive to briefly compare the optimal levels of monitoring with and without commitment. In the commitment case, monitoring is beneficial because it deters and prevents earnings manipulation. In the absence of commitment, monitoring no longer plays a deterrence function. In addition, since monitoring is not observable in the current setting, there is a standard moral hazard problem with respect to the monitoring choice, which results in an underprovision of monitoring (for $\beta < 1$). For these reasons, for any given levels of b and a_2, the audit committee's monitoring level is lower in the current setting than in the commitment setting.

Before we analyze the optimal size of the stock grant, b, we first discuss the equilibrium effects of a change in b on the CEO's and the board's action choices and the magnitude of earnings management, M. The equilibrium level of monitoring is determined by substituting (15) into (16), which yields:

$$e^* = \frac{\beta v_2 m b}{k_e k_2 + \beta v_2 m b}. \tag{17}$$

Equation (17) shows that the audit committee's optimal choice of monitoring increases with the pay-performance sensitivity, b. The audit committee anticipates that an increase in stock-based compensation increases the CEO's direct incentive to engage in manipulative activities. Since the marginal benefit of monitoring, $\beta v_2 a_2^*$, increases in the CEO's equilibrium choice of manipulation, an increase in the pay-performance sensitivity induces the audit committee to be a more vigilant overseer.

Proposition 1: The audit committee's choice of monitoring, e^*, increases with the pay-performance sensitivity, b.

The total effect of an increase in the pay-performance sensitivity on the amount of earnings management, $M(a_2,e)$, is ambiguous. On the one hand, holding the level of monitoring fixed, an increase in stock-based compensation increases the CEO's incentive to engage in manipulation, a_2, which increases M. This effect is weaker if the equilibrium level of oversight is larger (for example, if monitoring is perfect, $e = 1$, an increase in a_2 has no impact on M). On the other hand, since the audit committee anticipates the CEO's manipulative behavior, an increase in b also increases the audit committee's incentive to carefully oversee the reporting process. An increase in the equilibrium level of oversight reduces M not only directly, but also indirectly. The indirect effect occurs because the CEO correctly anticipates the equilibrium level of monitoring, and a higher conjectured level of e reduces the CEO's ex ante incentive to manipulate.

In Appendix B we show that there exists a threshold, $b_t \equiv k_e k_2/\beta v_2 m$, so that the magnitude of earnings management, M, increases with b for $b < b_t$, and decreases with b for $b > b_t$ (b_t is the pay-performance sensitivity that induces $e^* = 0.5$). Intuitively, for $b > b_t$, the CEO pay scheme induces a high equilibrium level of oversight ($e^* > 0.5$), which implies that the increase in a_2 has a weaker impact on M than the increase in e, resulting in a decline in M. Thus, for $b > b_t$, an attempt to limit earnings management by reducing the use of stock-based CEO compensation actually leads to an increase in the equilibrium level of M. In the remainder of the paper, we assume that the parameters of our model are such that $b_t \in (0,1)$.

Proposition 2: If the pay-performance sensitivity, b, increases, then the productive action, a_1^*, and the manipulative attempt, a_2^*, increase, and the magnitude of earnings management, M^*, increases for $b < b_t$ and decreases for $b > b_t$.

In stage 2, the compensation committee sets the parameters w_C and b of the CEO's incentive scheme, taking into account the effects of b on the equilibrium choices of a_1, a_2, and e. The compensation committee solves:

$$\max_{w_C,b} \beta E[V^{net}] + \gamma(w_A - 0.5k_e e^2), \tag{18}$$

subject to the action constraints (14), (15), and (16), and the CEO's participation constraint (9). The solution to this problem is given in Proposition 3.

Proposition 3: The compensation committee's optimal choice of b satisfies:

$$\frac{v_1^2}{k_1} - v_2\frac{m(1-e^*)^2}{k_2} - \frac{v_1^2}{k_1}b - \frac{m^2(1-e^*)^2}{k_2}b - rb\sigma_\eta^2 + \left((2-\gamma)v_2(1-e^*)\frac{m}{k_2}b + \frac{m^2(1-e^*)}{k_2}b^2\right)\frac{de^*}{db} = 0, \quad (19)$$

where e^* is determined by (17).

Without commitment to monitoring, the pay-performance sensitivity of the CEO's pay scheme plays an additional incentive role that is absent in the commitment case: larger stock-based CEO compensation induces the audit committee to become a more vigilant overseer. This positive spillover effect of CEO compensation is reflected in the additional term:

$$\left((2-\gamma)v_2(1-e^*)\frac{m}{k_2}b + \frac{m^2(1-e^*)}{k_2}b^2\right)\frac{de^*}{db} > 0, \quad (20)$$

which is missing in (10) in the benchmark case.

When choosing the pay-performance sensitivity, the board uses this spillover effect to indirectly commit to monitoring. That is, by increasing the link between CEO pay and performance, the board credibly signals to the CEO that it will take its oversight function seriously. This indirect commitment to monitoring is beneficial, since it curbs the CEO's incentive to engage in manipulation in the first place. In other words, a higher pay-performance sensitivity allows for monitoring to function as a deterrent in a situation in which a direct commitment to monitoring is not possible.

There is another reason why the compensation committee will use b as a tool to induce greater monitoring. Both the audit and the compensation committees weight the benefits of monitoring with β, but the compensation committee considers only a fraction γ of the cost of monitoring, while the audit committee considers the full cost. For this reason, the compensation committee finds it beneficial to increase b to induce the audit committee to work harder on the oversight task. However, this effect is only present if tasks are separated to some extent ($\gamma < 1$).

The feature that the pay-performance sensitivity serves as a tool to indirectly commit to higher monitoring has the following implication. If the cost of earnings management, v_2, increases, then the board does not necessarily respond to this change by reducing the pay-performance sensitivity. Instead, the board may actually increase stock-based CEO compensation in order to commit to a higher level of board oversight, which deters and prevents earnings management.

Proposition 4: There exist parameters for which the equilibrium pay-performance sensitivity increases if the firm's marginal cost of earnings management, v_2, increases.

The Role of the Committee Structure

The noncontractability of monitoring creates a role for task separation on boards. The degree of director overlap, γ, determines the extent to which the compensation committee is willing to use the pay-performance sensitivity, b, to indirectly commit to higher levels of monitoring. Intuitively, if director overlap, γ, decreases, the compensation committee is less involved in the oversight task and hence less concerned about the effort cost of monitoring. As a consequence, the compensation committee is willing to increase stock-based CEO compensation in order to implement a higher equilibrium level of oversight (see Equation (19)).

Proposition 5: As director overlap, γ, decreases, the compensation committee chooses a higher pay-performance sensitivity, b.

The next corollary directly follows from Propositions 1, 2, and 5.

Corollary 1: As director overlap,γ, decreases, the monitoring effort, e^*, the productive action, a_1^*, and the manipulative attempt, a_2^*, increase, and the magnitude of earnings management, M^*, increases for $b^* < b_t$ and decreases for $b^* > b_t$.

Corollary 1 implies that for the parameters for which it is optimal to select a relatively low (high) pay-performance sensitivity, the link between director overlap and earnings management is negative (positive). Clearly, the equilibrium pay-performance sensitivity is higher in firms in which the CEO's productivity of effort, v_1, is higher and/or where the environment is less uncertain (σ_η^2 is small). We expect that for these firms, a decrease in director overlap, which triggers an increase in b^*, reduces the level of earnings management.

Shareholders choose the structure of the board, γ, in stage 1 to maximize the expected net terminal value of the firm, $E[V^{net}]$. At the same time, the audit committee members obtain a fixed salary w_A, which compensates them for the expected equilibrium cost of monitoring. The shareholders' problem in stage 1 is the following:

$$\max_{\gamma} E[V^{net}],$$

subject to (14), (15), (16), (19), and the audit committee's participation constraint, $w_A = 0.5k_e e^2$.

Proposition 6: The optimal degree of director overlap for shareholders is given by $\gamma = \beta$.

When the compensation committee chooses the pay-performance sensitivity, it weights the positive effect of monitoring with β and the personal cost of monitoring with γ. As a result, for $\gamma > \beta$, the compensation committee cares "too much" about the cost of monitoring because it is to a large extent directly involved in the oversight task. In anticipation of burdensome monitoring, the compensation committee under-exploits the positive spillover effect of CEO incentive pay on board oversight and chooses a b that is too small from shareholders' perspective. For $\gamma < \beta$, the reverse problem occurs: the compensation committee cares "too little" about the cost of monitoring, because tasks are separated to a great extent. From the perspective of shareholders in stage 1, monitoring is costly because the audit committee must be compensated for the expected personal cost of oversight. As a result, for $\gamma < \beta$, the compensation committee chooses a b that is larger than the level desired by shareholders. For $\gamma = \beta$, the two effects are optimally balanced such that the compensation committee will find it optimal to choose the level of b that is optimal for shareholders in stage 1.

In practice, the director overlap in boards is likely also affected by other factors that we do not examine here. Several considerations could cause shareholders to choose a level of director overlap higher than the one identified in Proposition 6. For example, shareholders may decide to limit the size of the board to save compensation costs, reduce free-rider problems, or avoid untalented board members. Doing so will likely increase the level of director overlap, since regulatory standards establish requirements for the minimum size of committees as well as the level of independence and financial literacy. For example, the NYSE and NASD require listed companies to maintain audit committees with at least three directors, all of whom must be independent from management and financially literate.[5] Moreover, our model ignores the potential benefits of communication between board members who perform different functions. The benefits of information sharing between committees may provide a counterweight to the effects we outline in this study.

VI. EMPIRICAL IMPLICATIONS

The academic literature has identified and analyzed governance factors that are expected to influence the quality of the internal control process in corporations. Popular governance indicators are, for instance, the size of boards or committees, directors' degree of independence from the CEO, their stock ownership, and whether the CEO is also the chair of the board (Weisbach 1988; Jensen 1993; Yermack 1996; Core et al. 1999).

Our paper contributes to this literature by carving out another channel through which board structure has an impact. We focus on task separation on boards, which is arguably an important consequence of forming committees. The model provides predictions relating the board structure to board decision-making and organizational performance. What matters for our predictions is the degree of task separation on boards, γ. A straightforward way to measure the level of task separation is to look at the extent to which boards have adopted committees. Generally, boards with committees are expected to employ a greater degree of task separation than boards without committees. For those firms that are required to have board committees by regulation, possible proxies for the level of task separation are, e.g., whether the chairman of the compensation committee also sits on the audit committee or the fraction of compensation committee members who also serve on the audit committee.

For the purpose of illustration, it is interesting to take a look at the degree of task separation in the 30 corporations that comprise the Dow Jones Industrial Average. A review of these corporations' 2005 proxy statements shows that the size of the compensation committee ranges from three to seven members, and that on average, the members of the compensation committee sit on 1.47 other committees. However, for 12 corporations no member of the compensation committee also sits on the audit committee, and for ten corporations only one member sits on both committees. For only seven corporations does the chairman of the compensation committee also serve on the audit committee. The 2006 proxy statements for the S&P 100 firms show similar numbers: for nearly 50 percent (23 percent) of the companies there is no (one) member of the compensation committee sitting on the audit committee. In about 20 percent of the cases, the chairman of the compensation committee also serves on the audit committee. Thus, for most firms, the degree of director overlap between the compensation committee and the audit committee is relatively small. This observation suggests that the introduction of committees does indeed result in a separation of the two functions of setting CEO compensation and oversight.

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[5] See NYSE Listed Company Manual §303.01, §303A.06, and §303A.07.

Board Structure and CEO Compensation

Our analysis indicates a link between the structure of the board and CEO incentive pay. In particular, the model predicts that a reduction in the degree of director overlap leads to a greater pay-performance sensitivity of CEO compensation. We are not aware of any existing empirical research that examines this relation.

CEO Compensation and Earnings Management

Policymakers and regulators have devoted special attention to determining the cause of recent accounting scandals. Some observers have suggested that the increased use of stock-based compensation has motivated executives to manipulate accounting information. However, the extant empirical evidence on the link between CEO equity incentives and accounting irregularities is at best mixed (see Armstrong et al. [2008] for a detailed discussion of the literature). While there are studies that find some evidence of a positive association between the level of stock-based and, in particular, option-based compensation and earnings manipulation (e.g., Cheng and Warfield 2005; Bergstresser and Philippon 2006; Burns and Kedia 2006; Peng and Röell 2008), Erickson et al. (2006) do not find consistent evidence of such a link, and Armstrong et al. (2008) provide some evidence suggesting a negative effect of CEO equity incentives on the frequency of accounting irregularities.

The lack of a clear relation between CEO incentive pay and accounting manipulation is consistent with the results in our paper. In our setting, an increase in the pay-performance sensitivity not only has a positive effect on the CEO's direct incentive to engage in manipulation, but also on the audit committee's incentive to diligently oversee the accounting process. Due to these two countervailing forces, the amount of earnings management can increase or decrease with the level of CEO incentive pay. However, we do not want to overstress this point, since there are alternative explanations for the lack of correlation between CEO incentives and accounting fraud. For example, boards may offer executives high-powered incentive schemes only in firms in which, for exogenous reasons, it is more difficult or costly to manipulate the earnings report.

Board Structure and Oversight

Our model predicts that a reduction in the degree of director overlap leads to better oversight of the financial reporting process. However, the link between board structure and monitoring is indirect. A lower director overlap results in a greater pay-performance sensitivity of CEO compensation, which in turn enhances the audit committee's incentive to carefully oversee financial reporting.

There are no studies that we know of that directly test our prediction, since the level of board oversight is hard to measure. However, there is a large body of empirical research that examines the relation between board structure and earnings management. Our model suggests that it is important to control for the pay-performance sensitivity when analyzing this relation. Without such a control variable, it is difficult to interpret the empirical findings, because a lower magnitude of earnings management can be the result of better monitoring or the use of compensation systems that are less sensitive to performance.

To elaborate on this issue, consider a hypothetical study that finds no association between the presence of audit committees and the extent of earnings management. One might be tempted to conclude that audit committees do not play an important role in the corporate governance process. However, as our model shows, this conclusion might be wrong. If one accepts the assumption that the formation of committees leads to an increase in task separation, then our model predicts that the presence of audit committees positively affects the pay-performance sensitivity of CEO compensation. This increase in CEO incentive pay changes both the CEO's direct incentive to manipulate and the level of board oversight. The two effects work in opposite directions, implying that, on average, the amount of earnings management may not change. However, this does not indicate that the adoption of audit committees has no effect on corporate governance; the move toward more performance-sensitive pay systems, which is triggered by greater task separation, also enhances the CEO's incentive to work hard on productive tasks, which has a positive effect on firm value.

The empirical studies that analyze whether the existence of audit committees influences the quality of the financial reporting process produces mixed evidence. Dechow et al. (1996) and Beasley et al. (2000) find a positive association between audit committee presence and financial reporting quality, but Beasley (1996) and Peasnell et al. (2005) find no such relation.

VII. CONCLUSION

Arguably, two of the most important board functions are setting CEO pay and overseeing the financial reporting process. Different committees are responsible for performing these functions, yet both functions are very closely related. Stock-based compensation schemes encourage the CEO to manipulate earnings, which in turn makes it necessary for the board to act as a vigilant overseer. Compensation committee members who are not involved in the oversight process will favor a higher pay-performance sensitivity of CEO compensation than will board members who are responsible for overseeing financial reporting. As a consequence, the separation of board functions is associated with greater stock-based CEO compensation. However, the increase in CEO equity incentives does not necessarily lead to a higher level of earnings management because the audit committee will adjust its oversight effort in response to a change in CEO incentives. Our analysis provides testable predictions concerning the relations between board committee structure, CEO compensation, board oversight, and earnings management.

Important incentives for board members to act as overseers of the financial reporting process also stem from their fiduciary duty and potential liability claims (Gutierrez 2003). In our model we do not consider claims against directors. However, our qualitative results continue to hold when directors face legal penalties. The Sarbanes-Oxley Act of 2002 assigns directors serving on the audit committee with the special responsibility for overseeing the firm's financial accounting process. Hence, when task separation on boards is greater, the compensation committee will be less concerned about potential legal sanctions. This again implies that the separation of board functions will lead to a stronger pay-performance sensitivity of CEO compensation, which, in turn, will increase the audit committee's incentive to carefully oversee the reporting process.

APPENDIX A
NOTATION DESCRIPTIONS

V = long-term gross firm value (stage 4);
V^{net} = long-term net firm value (V net of compensation and direct cost of manipulation);
S_t = interim share price in stage t;
w_C = CEO's fixed pay;
b = pay-performance sensitivity of CEO compensation;
R = interim earnings report (stage 3);
β = weight that board puts on long-term net firm value;

w_B = non-contingent board members' base salary;
w_A = non-contingent audit committee's compensation;
a_1 = CEO's productive activity;
a_2 = CEO's manipulative activity;
$e \in [0,1]$ = audit committee's monitoring effort;
$c(a_i) = 0.5k_i a_i^2$ = CEO's cost of undertaking activity a_i, $a_i \in \{a_1,a_2\}$;
$c(e) = 0.5k_e e^2$ = audit committee's cost of monitoring;
$v_1 > 0$ = marginal productivity of CEO effort;
$v_2 > 0$ = marginal direct cost of earnings management;
$M = (1 - e)a_2$ = level of earnings management;
$\gamma \in [0,1]$ = director overlap or degree of task separation on the board; and
r = CEO's risk-aversion coefficient

APPENDIX B

Proof of Lemma 1

The CEO takes his actions in stage 3. At that time, the expected share price is given by:

$$E[S_3(R(a_1,a_2))] = v_1a_1 + m(1 - e)a_2 - m(1 - e)a_2^* - v_2(1 - e)a_2^* - w_A - w_C - bS_2, \tag{21}$$

where S_2 is a constant. Substituting (21) into (4) yields:

$$\max_{a_1,a_2} w_C + b[(v_1a_1 + m(1 - e)a_2 - m(1 - e)a_2^* - v_2(1 - e)a_2^* - w_A - w_C - bS_2)] - 0.5k_1a_1^2 - 0.5k_2a_2^2 - 0.5rb^2\sigma_\eta^2.$$

Calculating the first-order conditions with respect to a_1 and a_2 yields (6) and (7). ■

Proof of Lemma 2

Substituting $E[V^{net}] = v_1a_1 - v_2(1 - e)a_2 - w_C - bE[S_3(R)] - w_A$, (9), (6), and (7) into (8) gives:

$$\max_b \beta\left[\frac{v_1^2}{k_1}b - v_2\frac{m(1 - e)^2}{k_2}b - 0.5\frac{v_1^2}{k_1}b^2 - 0.5\frac{m^2(1 - e)^2}{k_2}b^2 - 0.5rb^2\sigma_\eta^2 - w_A\right] + \gamma(w_A - 0.5k_e e^2).$$

Calculating the first-order condition with respect to b yields (10). ■

Proof of Lemma 3

Substituting (6), (7), (9), and $w_A = 0.5k_e e^2$ into the shareholders' objective function $E[V^{net}] = v_1a_1 - v_2(1 - e)a_2 - w_C - bE[S_3(R)] - w_A$, shareholders' problem can be stated as:

$$\max_e \frac{v_1^2}{k_1}b^* - v_2\frac{m(1 - e)^2}{k_2}b^* - 0.5\frac{v_1^2}{k_1}b^{*2} - 0.5\frac{m^2(1 - e)^2}{k_2}b^{*2} - 0.5rb^{*2}\sigma_\eta^2 - 0.5k_e e^2,$$

where b^* satisfies (10). The first-order condition for an optimal level of e is:

$$\left[\frac{v_1^2}{k_1} - v_2\frac{m(1-e)^2}{k_2} - \frac{v_1^2}{k_1}b^* - \frac{m^2(1-e)^2}{k_2}b^* - rb^*\sigma_\eta^2\right]\frac{db^*}{de}$$
$$+ 2v_2(1-e)\frac{m}{k_2}b^* + \frac{m^2(1-e)}{k_2}b^{*2} - k_e e = 0.$$

Since the expression in brackets is zero in equilibrium (see (10)), the above condition simplifies to (11). ■

Proof of Lemma 4

Substituting:

$$E[S_3(R(a_1,a_2,e^*))] = v_1a_1 + m(1-e^*)a_2 - m(1-e^*)a_2^*$$
$$- v_2(1-e^*)a_2^* - w_C - bS_2 - w_A$$

into (12) yields:

$$\max_{a_1,a_2} w_C$$
$$+ b[v_1a_1 + m(1-e^*)a_2 - m(1-e^*)a_2^* - v_2(1-e^*)a_2^* - w_C - bS_2 - w_A]$$
$$- 0.5k_1a_1^2 - 0.5k_2a_2^2 - 0.5rb^2\sigma_\eta^2.$$

Calculating the first-order conditions with respect to a_1 and a_2 gives Equations (14) and (15).

Note that at the time the audit committee chooses e, the stage 2 stock price, S_2, is a constant. Using (13), calculating the first-order condition with respect to e yields (16). ■

Proof of Proposition 2

We first show that the equilibrium level of manipulation, a_2^*, increases with b. The first derivative of (15) with respect to b is:

$$\frac{da_2^*}{db} = \frac{m(1-e^*)}{k_2} - \frac{m}{k_2}b\frac{de^*}{db}. \tag{22}$$

From (17) it follows that $\frac{de^*}{db} = \frac{\beta v_2mk_ek_2}{(k_ek_2 + \beta v_2mb)^2}$. Substituting $\frac{de^*}{db}$ into (22) and rearranging terms yields:

$$\frac{da_2^*}{db} = \frac{m}{k_2}(1-e^*)^2.$$

We next show that $\frac{dM}{db} > 0$ for $b < b_t$ and $\frac{dM}{db} < 0$ for $b > b_t$. Given $M = (1-e)a_2$, we have:

$$\frac{dM}{db} = -a_2^* \frac{de^*}{db} + (1 - e^*) \frac{m}{k_2} (1 - e^*)^2.$$

Substituting $\frac{de^*}{db} = \frac{\beta v_2 m k_e k_2}{(k_e k_2 + \beta v_2 m b)^2} = \frac{\beta v_2 m}{(k_e k_2 + \beta v_2 m b)} (1 - e^*)$ and (15) into the equation above and rearranging yields:

$$\frac{dM}{db} = -(1 - e^*)^2 \frac{m}{k_2} [2e^* - 1].$$

Hence, if follows that $\frac{dM}{db} > 0$ for $b < b_t = \frac{k_e k_2}{\beta v_2 m}$ and $\frac{dM}{db} < 0$ for $b > b_t = \frac{k_e k_2}{\beta v_2 m}$. ■

Proof of Proposition 3

Substituting $E[V^{net}] = v_1 a_1 - v_2(1 - e)a_2 - w_C - bE[S_3(R)] - w_A$, (14), (15), and (9) into (18) yields:

$$\max_b \beta \left(\frac{v_1^2}{k_1} b - v_2 \frac{m(1 - e^*)^2}{k_2} b - w_A - 0.5 \frac{v_1^2}{k_1} b^2 - 0.5 \frac{m^2(1 - e^*)^2}{k_2} b^2 - 0.5 r b^2 \sigma_\eta^2 \right)$$
$$+ \gamma(w_A - 0.5 k_e e^{*2}),$$

where e^* satisfies (17). Recognizing that e^* is a function of b, the first order condition for an optimal choice of b is:

$$\beta \left(\frac{v_1^2}{k_1} - v_2 \frac{m(1 - e^*)^2}{k_2} - \frac{v_1^2}{k_1} b - \frac{m^2(1 - e^*)^2}{k_2} b - r b \sigma_\eta^2 \right)$$
$$+ \beta \left(2v_2(1 - e^*) \frac{m}{k_2} b + \frac{m^2(1 - e^*)}{k_2} b^2 \right) \frac{de^*}{db} - \gamma k_e e^* \frac{de^*}{db} = 0.$$

Rewriting (17) as $e^* k_e = \frac{\beta v_2 m b}{k_2} (1 - e^*)$ and substituting this into the equation above yields (19) in Proposition 3. ■

Proof of Proposition 4

Let

$$F \equiv \frac{v_1^2}{k_1} - v_2 \frac{m(1 - e^*)^2}{k_2} - \frac{v_1^2}{k_1} b - \frac{m^2(1 - e^*)^2}{k_2} b - r b \sigma_\eta^2$$
$$+ \left((2 - \gamma) v_2 (1 - e^*) \frac{m}{k_2} b + \frac{m^2(1 - e^*)}{k_2} b^2 \right) \frac{de^*}{db} = 0.$$

Recall that in the optimum it holds that $F = 0$ (see (19)). The first derivative of b^* with respect to v_2 is given by $\frac{db^*}{dv_2} = -\frac{\partial F}{\partial v_2} \Big/ \frac{\partial F}{\partial b}$. Note that $\frac{\partial F}{\partial b}$ is negative since we assumed that

m is small enough to ensure a concave optimization problem. Hence, in order to determine the sign of $\frac{db^*}{dv_2}$ we need to find $\frac{\partial F}{\partial v_2}$. It holds that:

$$\begin{aligned}\frac{\partial F}{\partial v_2} = &-\frac{m(1-e^*)^2}{k_2} + 2v_2\frac{m(1-e^*)}{k_2}\frac{\partial e^*}{\partial v_2} + 2\frac{m^2(1-e^*)}{k_2}\frac{\partial e^*}{\partial v_2}b\\ &+\left((1-e^*)\frac{m}{k_2}b(2-\gamma) - v_2\frac{\partial e^*}{\partial v_2}\frac{m}{k_2}b(2-\gamma) - \frac{\partial e^*}{\partial v_2}\frac{m^2}{k_2}b^2\right)\frac{\partial e^*}{\partial b}\\ &+\left(v_2(1-e^*)\frac{m}{k_2}b(2-\gamma) + \frac{m^2(1-e^*)}{k_2}b^2\right)\frac{\partial^2 e^*}{\partial b\partial v_2}. \qquad (23)\end{aligned}$$

Using (17), we have $\frac{\partial e^*(b,v_2)}{\partial v_2} = \frac{\beta mb}{(k_e k_2 + \beta v_2 mb)}(1-e^*)$, $\frac{\partial e^*(b,v_2)}{\partial b} = \frac{\beta v_2 m}{(k_e k_2 + \beta v_2 mb)}(1-e^*)$, and $\frac{\partial^2 e^*(b,v_2)}{\partial b\partial v_2} = \frac{(1-e^*)\beta m}{(k_e k_2 + \beta v_2 mb)}[1-2e^*]$. Substituting this into (23) and rearranging gives:

$$\begin{aligned}\frac{\partial F}{\partial v_2} = &-\frac{m(1-e^*)^2}{k_2}(1-2e^*) + (2-\gamma)\frac{m(1-e^*)^2}{k_2}e^*[2-3e^*]\\ &+3\frac{(1-e^*)^2\beta mb}{(k_e k_2 + \beta v_2 mb)}\frac{m^2}{k_2}b[1-e^*]. \qquad (24)\end{aligned}$$

Equation (24) shows that a sufficient condition for $\frac{db^*}{dv_2} > 0$ is that $e^* > 0.5$ and $e^* < \frac{2}{3}$. Let $b^*(v_1)$ denote the equilibrium level of b^* as a function of v_1. Let v_1^A be the level of v_1 that satisfies $b^*(v_1^A) = b_t$, and let v_1^B be the level of v_1 that satisfies $b^*(v_1^B) = b_T$, where b_T satisfies $b_T = 2\frac{k_e k_2}{\beta v_2 m}$. Note that $v_1^A < v_1^B$. Since $b^*(v_1)$ is increasing in v_1, and b_t and b_T are independent of v_1, we have $b^*(v_1) > b_t$ for $v_1 > v_1^A$ (which means that $e^* > 0.5$) and $b^*(v_1) < b_T$ for $v_1 < v_1^B$ (which means that $e^* < 2/3$). It follows that $\frac{db^*}{dv_2} > 0$ for all $v_1^A < v_1 < v_1^B$. ■

Proof of Proposition 6

The shareholder's choice of γ determines the compensation committee's choice of b in stage 2. Shareholders' optimal strategy in stage 1 is therefore to choose the γ that induces the compensation committee to choose the b that maximizes stage 1 firm value. Shareholder's optimal level of b in stage 1, denoted b^S, can be found by solving:

$$\max_b E[V^{net}],$$

subject to (14), (15), (16), (9), and $w_A = 0.5k_e e^2$. Using $E[V^{net}] = v_1 a_1 - v_2(1-e)a_2 - w_C - bE[S_3(R)] - w_A$, (9), and $w_A = 0.5k_e e^2$, the objective function can be written as:

$$\max_b v_1 a_1 - v_2(1-e)a_2 - 0.5k_1 a_1^2 - 0.5k_2 a_2^2 - 0.5rb^2\sigma_\eta^2 - 0.5k_e e^2.$$

Recall that the compensation committee chooses the b in stage 2 that solves:

$$\max_{b} \beta E[V^{net}] + \gamma(w_A - 0.5k_e e^2), \tag{25}$$

subject to (14), (15), (16), and (9). Using (9), for $\gamma = \beta$, the compensation committee's objective function can be written as:

$$\max_{b} \beta[v_1 a_1 - v_2(1 - e)a_2 - 0.5k_1 a_1^2 - 0.5k_2 a_2^2 - 0.5rb^2\sigma_\eta^2 - 0.5k_e e^2]. \tag{26}$$

This shows that the compensation committee will find it optimal to choose $b^* = b^S$ if and only if $\gamma = \beta$. ■

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Do Direct Cash Flow Disclosures Help Predict Future Operating Cash Flows and Earnings?

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ABSTRACT: Motivated by recent FASB, IASB, and CFA Institute comments, we explore the predictive value of direct method cash flow disclosures. A primary stated purpose of the direct method is to better forecast future performance. To examine this purpose, we first document that direct method line items, such as cash received from customers, are not reliably estimable using income statements and either balance sheets or indirect method statements of cash flows. When these estimation (articulation) errors are included in cash flows and earnings forecasting models, forecasting performance significantly improves. In addition, employing a future ERC (FERC) methodology, we find evidence suggesting that market participants utilize direct method disclosures for their stated purpose: to better forecast future operating performance. After conducting several tests for self-selection concerns, we conclude that the direct method is valuable to investors when forecasting future cash flows and earnings.

Keywords: *statement of cash flows; direct method; forecasting future cash flows and earnings; future earnings response coefficient (FERC); stock price informativeness.*

Data Availability: *Data are available from the sources listed in the text.*

I. INTRODUCTION

This study investigates whether direct method (DM) cash flow statements improve predictions of future operating cash flows and earnings, thereby yielding stock prices that better reflect future performance. A firm's ability to generate operating cash flows (CFO) and earnings is closely linked to firm value, and thus a primary objective of financial reporting is to provide information to help accounting users assess the amount

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and timing of prospective cash flows and earnings.[1] While proponents of DM statements claim that DM information is beneficial for forecasting future cash flows and earnings, little evidence exists addressing this claim. The objective of this study is to investigate whether DM cash flow statements enable better predictions of future performance incremental to the more popular indirect method (IM) approach.

We are motivated to pursue this study because there are ongoing discussions about the benefits of DM presentation, despite only limited relevant empirical evidence. Both FASB standards and IASB standards allow either the DM or IM format, but both encourage DM presentation.[2] A joint IASB and FASB research initiative in 2005 identified DM statements of cash flows as a pertinent, timely research topic important to standard setters.[3] Further, a CFA Institute monograph on financial reporting for investors (CFA Institute 2005) lists DM statements of cash flows as one of 12 significant reforms needed to improve financial reporting. It emphasizes that DM cash flow components are needed by investors to forecast a firm's future cash flows.[4] The CFA Institute notes that most firms provide insufficient information for even a skilled analyst to reconstruct DM components, concluding that estimating DM components "greatly reduces the reliability and usefulness of the information generated" (CFA Institute 2005, 27). Despite CFA Institute, IASB, and FASB stated preferences for DM statements, the vast majority of firms currently disclose the IM statements of cash flows.[5]

Current knowledge about DM disclosures is supported by only a few studies, including Krishnan and Largay (2000), Cheng and Hollie (2008), and Clinch et al. (2002). While all conclude the DM is useful, these studies offer limited empirical evidence applicable to U.S. firms due to various research design choices. We discuss and address these choices in our study.

We pursue three interrelated research questions that, taken together, aim to extend our understanding of DM disclosures. First, we demonstrate that DM line item components such as cash received from customers cannot be accurately estimated using income statements and IM cash flow statements (hereafter, IM_SCF approach).[6] Obviously if DM components could be derived from IM statements and other disclosures, then any discussion would be essentially moot. Krishnan and Largay (2000) provide evidence of articulation errors when estimating DM components with combined balance sheet and income statement information (hereafter, IM_BS approach). Prior research suggests that the IM_SCF approach should yield less severe and fewer articulation errors.[7] Conclusions reached by Krishnan and Largay (2000) favoring DM disclosures could be premature to the extent that DM components can more accurately be estimated by the IM_SCF approach. However, our evidence shows that extensive articulation errors exist in our sample even when the IM_SCF approach is used, in support of the CFA Institute's conclusion that "it is impossible to relate the adjustments in the indirect method cash flow statement to any single income statement line item" (CFA Institute 2005, 27).

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[1] See Statement of Financial Accounting Concepts (SFAC) No. 1, *Objectives of Financial Reporting by Business Enterprises* (FASB 1978).

[2] See International Accounting Standard (IAS) 7, *Cash Flow Statements* (IASB 1992) and Statement of Financial Accounting Standards (SFAS) No. 95, *Statement of Cash Flows* (FASB 1987).

[3] The Reporting Financial Performance (RFP) Research Program promotes research to inform the IASB's decision process. RFP is a joint project of the IASB, the FASB, and several IASB national standard-setting partners. They asked, "Is the direct method for the statement of cash flows preferable to the indirect method, and if so why?"

[4] The monograph states that cash collected from customers is the single most important direct cash flow number investors require for analysis and a primary indicator of a company's cash-generating ability (CFA Institute 2005, 27) and that a primary purpose for this information is forecasting future cash flows (CFA Institute 2005, 6).

[5] *Accounting Trends and Techniques* published by the American Institute of Certified Public Accountants (AICPA 2005) reports that of 600 U.S. public firms surveyed over 2001–2004, only seven or eight firms disclosed DM statements of cash flows each year. Because few firms were expected to use the DM, FASB requires DM disclosing firms to also provide an IM schedule for comparability (SFAS No. 95, paras. 29–30). However, no separate DM schedule is required with IM statements. Miller and Bahnson (2002) argue that dual reporting required with DM disclosure may cause managers to prefer the IM.

[6] Some prior studies (e.g., Bahnson et al. 1996; Krishnan and Largay 2000) refer to these estimation errors as "articulation errors." We use the two terms interchangeably.

Our second research question asks whether DM disclosure is incrementally useful for forecasting future firm performance. Specifically, we examine whether articulation errors resulting from either IM_SCF or IM_BS estimates provide incremental explanatory power when forecasting future CFO and earnings. Investigating this research question is important because predicting future CFO and earnings is not only an integral part of widely used valuation processes, but also is a stated purpose for use of financial statement disclosures in general per SFAC No. 1 and the statement of cash flows in particular per SFAS No. 95.[8] Using hand-collected data from DM statements, we find that DM disclosures are incrementally informative beyond IM disclosures when predicting future CFO and earnings. In particular, when articulation errors for the two largest DM components, cash received from customers and cash paid to employees and suppliers, are included in our prediction models, we find that coefficients on articulation errors indicate significant additional explanatory power.

As a third research question, we investigate whether DM statements of cash flows allow current stock returns to better reflect information about future earnings and cash flows, employing a future earnings response coefficient (FERC) methodology. In contrast to our previous prediction tests, this research question addresses whether the market uses DM disclosures, when available, for setting stock prices. If DM disclosures reveal important incremental information about future operations, as indicated by our prediction tests, then disclosure activity should "bring the future forward" into current returns to the extent that market participants utilize this information (Lundholm and Myers 2002). Consistent with this prediction, we find that DM disclosures yield current returns that are more highly associated with realized future earnings and CFO, suggesting that disclosed DM components provide investors with a useful basis for estimating firms' future performances, incremental to information available from IM statements. We also find no evidence of a stronger or weaker *contemporaneous* association between returns and current earnings or CFO for firms disclosing DM statements. This result implies that DM disclosures allow market participants to reflect more information about future fundamentals in current returns, without decline in the relevance of current earnings or CFO.

Self-selection is an important concern with our FERC results because SFAS No. 95 allows a firm to choose between producing only an IM statement or a DM statement (which must be supplemented with IM disclosures). Our FERC results are robust to a battery of sensitivity checks controlling for sample firm characteristics and self-selection. Both a Heckman (1979) two-stage approach and a propensity score matching approach (LaLonde 1986) indicate that our findings are not driven by self-selection bias. Further, when we examine FERC in the 1985–1987 period prior to adoption of SFAS No. 95, we find no meaningful difference in FERC between firms that later chose either the DM or IM when they adopted SFAS No. 95, indicating that it is DM disclosure, not other firm attributes, that drives our results. Finally, using a subsample of firms that disclosed DM statements in some years but not others, we find that DM disclosure is associated with higher FERC only when these firms disclose DM statements. We conclude that self-selection issues are unlikely to explain our results.

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[7] Bahnson et al. (1996) and Hribar and Collins (2002) document that changes in balance sheet operating accounts do not reconcile with changes shown on the IM statement of cash flows. This finding implies that estimates of DM components from changes shown on the IM statement (i.e., the IM_SCF approach) will potentially yield fewer and smaller articulation errors.

[8] SFAC No. 1, para. 47 states, "Investors, creditors and others often use reported earnings and information about the components of earnings ... to help them ... predict future earnings." SFAS No. 95, para. 107 states, "Knowledge of the specific sources of operating cash receipts and the purposes for which operating cash payments were made in the past (from direct method) may be useful in estimating future operating cash flows."

Our study contributes to the extant literature in several ways. First, extending prior studies, we document that estimating DM components from IM statements of cash flows produces nontrivial articulation errors. This result confirms the view of the CFA Institute that conversion from indirect to direct components is not a simple mechanical exercise. Second, we document potential determinants of firms' decisions to disclose DM statements. Investigating this issue not only helps control for self-selection bias (a concern with our FERC tests), but also provides important insights for standard-setters into benefits and costs firms face when disclosing DM statements.

Third, this study demonstrates that DM components from various operating activities evidence differential persistence into future cash flows and earnings. While Krishnan and Largay (2000) and Cheng and Hollie (2008) ask similar research questions with regard to forecasting CFO, our study has an important distinction. Namely, we examine whether the DM statement is incrementally useful for predicting future CFO. Conversely, Krishnan and Largay (2000) run a "horserace" between IM and DM prediction models to see which model produces lower errors when forecasting one-period-ahead CFO, overlooking the fact that DM components can be estimated from IM statements. Cheng and Hollie (2008) show that estimated DM components improve prediction of future CFO relative to aggregate CFO. Since they use *estimated* DM components for their tests, not actual DM components, it is unclear whether DM disclosures themselves enhance predictions of future CFO.

Finally, we provide the first empirical evidence that DM disclosures improve the mapping from future earnings and CFO to stock prices. This finding is important because more efficient (informative) prices likely lead to more efficient resource allocation in the economy.[9] Our FERC approach contrasts with the *contemporaneous* association tests used by Clinch et al. (2002). Besides using an Australian sample that may not extrapolate to a U.S. setting, they do *not* find that DM disclosures incrementally explain stock returns for their full sample of industrial firms. The lack of significance may be due to not including future earnings in their test design. Utilizing a FERC framework is more directly aligned with arguments by the CFA institute (2005) and SFAS No. 95 about the purpose and use of DM disclosures.

In Section II, we review prior literature and discuss hypotheses. Section III presents our research design with Sections IV and V describing our sample and empirical findings, respectively. Section VI concludes.

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[9] Tobin (1982) describes the stock market as functionally efficient if stock prices direct capital to its highest value uses. He points out that a necessary condition for functional stock market efficiency is that share prices track firm fundamentals closely. Durnev et al. (2003) link informational efficiency and functional efficiency.

II. LITERATURE AND HYPOTHESES

Articulation Errors

We first document the size and prevalence of articulation errors when DM components are estimated with the IM_SCF approach. A prior study by Krishnan and Largay (2000) established that articulation errors exist for U.S. firms when components are estimated from balance sheet and income statement information (i.e., the IM_BS approach), but this result is not surprising as some balance sheet current assets/liabilities reflect non-operating transactions and thus introduce noise into the estimation. Specifically, Hribar and Collins (2002) provide evidence implying that non-operating transactions such as mergers and acquisitions, reclassifications, divestitures, write-offs, accounting changes, and foreign currency translations will introduce systematic errors into estimates of DM components when the IM_BS approach is used. Their results also imply that articulation errors will still exist after removing the effects of mergers and acquisitions, discontinued operations (a proxy for divestitures), and foreign currency translations.

To our knowledge, no prior studies have examined possible articulation errors using the IM_SCF approach for U.S. firms. If IM_SCF articulation errors do not exist, then IM disclosures can be used to build accurate DM statements of cash flows. SFAS No. 95 alludes to this perspective in paragraphs 116–118 and 121, while acknowledging possible (presumably innocuous) estimation errors. Further, the fact that both the IM and DM by definition reconcile to the same CFO number lends support to the idea that converting from an IM to DM statement of cash flows is largely a mechanical exercise.

Offsetting the view that the IM_SCF approach generates reasonably accurate DM component amounts is CFA Institute (2005), which claims that skilled analysts cannot create accurate DM statements because it is impossible to relate IM reconciling amounts to particular income statement line items. Netting and reclassifying transactions on the IM statement presumably cause IM_SCF estimation errors at the component level. Exploring the CFA Institute's comments, we developed Appendix A, which offers anecdotal evidence illustrating the CFA Institute's viewpoint for two large firms that voluntarily disclosed DM statements. This exercise demonstrates that both IM_BS and IM_SCF approaches exhibit estimation errors, although the two firms have relatively simple business and financial statements. Using our DM sample, we first investigate whether the IM_SCF approach yields error-free estimates of DM line items before examining the predictive value of DM disclosures.

Forecasting Future Cash Flows and Earnings

As a second research question we ask whether DM disclosures improve forecasts of future cash flows and earnings. In particular, we examine whether actual IM_SCF articulation errors are incrementally useful beyond estimates of DM components when forecasting future CFO and earnings. Both SFAS No. 95 (para. 107) and the CFA Institute (2005) advocate DM disclosures over IM disclosures because the DM is expected to enhance predictions. However, if DM components can be estimated from IM disclosures without resultant articulation errors, DM disclosures would be redundant information. We hypothesize that the DM format improves predictability of future cash flows and earnings because of the existence of articulation errors. This leads to the following hypothesis:

H1: Articulation errors incorporate information that enhances predictions of future earnings and cash flows from operations.

A few prior studies relate to this research hypothesis. Barth et al. (2001) find that disaggregating earnings into various accrual components and CFO improves predictability of future cash flows. They show that each accrual component reflects different information about future cash flows and that aggregating all accrual components masks this information. They suggest that disaggregating CFO into DM components may further improve predictive ability of their models if DM components, including cash received from customers, cash paid to suppliers and employees, cash paid for interest, and cash paid for taxes, have different levels of persistence for future CFO. Consistent with Barth et al.'s (2001) suggestion, Cheng and Hollie (2008) find that estimated cash flow components from various operating activities persist differentially; cash related to sales, cost of goods sold, and operating expenses persists more than cash flows related to interest, taxes, and other expenses, and that the persistence of cash flow components are generally higher than those of accruals. It is important to note for our study that Cheng and Hollie (2008) use *estimated* cash flow components for predicting future CFO, and therefore do not test whether DM statements are incrementally useful information beyond estimated DM components when predicting future cash flows.[10]

Similar in spirit to our study, Krishnan and Largay (2000) investigate whether DM components better predict future cash flows than IM components by developing time-series models that predict one-year-ahead operating cash flows. Their IM model predicts CFO using items similar to IM components, while their DM model uses either disclosed (for DM disclosure firms) or estimated (for IM disclosure firms using the IM_BS approach) DM components to predict CFO. Comparing predictive abilities based on mean absolute percentage forecast errors, they find that the DM model yields lower errors, regardless of whether disclosed or estimated DM components are used in the model. Implicitly, their test design assumes that users have either IM or DM information, but not both. However, SFAS No. 95 requires firms producing a DM statement of cash flows to provide an IM reconciliation. Thus, a pertinent issue we address is whether DM disclosure is incrementally informative to IM information.[11]

Information Reflected in Stock Prices

Our third research question asks whether information revealed by DM disclosures is reflected in stock returns. If DM statements are incrementally helpful in predicting future performance, then such information should be reflected in current stock returns. Alternatively, if the information is too trivial to be detected in returns or perhaps firms selecting the IM provide enough other disclosures to correctly infer DM components, DM statements may not reveal incremental information about future performance to the market.

The FERC framework, initially developed by Collins et al. (1994), is particularly relevant to this research question as both the CFA Institute (2005) and SFAS No. 95 (paras. 5 and 107) state that forecasting future performance is a primary purpose of the cash flows statement and disclosure of DM statements provides a more useful basis for estimating future performance. One can see this advantage intuitively with the following example:

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[10] We also follow the DM components recommended by SFAS No. 95. Cheng and Hollie (2008) create a different DM component scheme. Our sample DM firms follow the SFAS No. 95 categorization scheme.

[11] Another improvement in our testing procedure can be seen with respect to cash paid for taxes and cash paid for interest. Krishnan and Largay (2000) exclude these required disclosures from their IM prediction model but include them in their DM prediction model, where they are generally statistically significant. However, these items are required disclosures even when IM statements are presented (SFAS No. 95, para. 121). This research design choice favors DM disclosures.

Suppose an accounting user predicts product selling prices of a firm to increase by 6 percent in the following year and inventory purchase costs by 4 percent. DM disclosures of cash received from customers or cash paid to suppliers can be multiplied by 106 percent and 104 percent, respectively, to construct cash forecasts. However, there is no simple way to forecast with IM disclosures. Existence of articulation errors only enhances the potential value of DM disclosures beyond this intuitive example. Further, when DM components are expected to persist differently for future time horizons, decomposed cash flow analyses may better allow investors to infer the permanence of future earnings. Such cash flow analyses for future performance are widely used for credit analysis, assigning loan terms, earnings quality assessments, solvency forecasts, and setting dividend and expansion policies.

Collins et al. (1994) argue that lack of timeliness implies that future earnings should be included in the price-earnings relation. Gelb and Zarowin (2002) extend the argument of Collins et al. (1994), noting that an objective of disclosure is to help investors predict future earnings and cash flows. Lundholm and Myers (2002) also show that disclosure activity can "bring the future forward." In these studies, the coefficient on future earnings in the return-earnings regression is called the future earnings response coefficient (FERC), which is argued to measure stock price efficiency or informativeness, i.e., the amount of future earnings information reflected in current returns.[12] Consistent with the FERC framework, if DM disclosure reveals to the market incrementally useful information relevant to firms' future performance, then more information about future earnings and cash flows will be reflected in current returns. This leads to the following hypothesis in alternative form:

H2: Firms disclosing DM statements of cash flows reflect more future earnings and operating cash flow information in current returns than firms disclosing IM statements of cash flows.

A previous study relating DM disclosures to stock returns is Clinch et al. (2002). They examine whether disclosed DM components provide incremental contemporaneous explanatory power for returns beyond aggregate (net) CFO or estimated DM components utilizing an earnings response coefficient (ERC) framework. Based on a relatively small sample of 146 Australian firms that are required to disclose both DM and IM statements of cash flows, initially they fail to find evidence that DM disclosure enhances contemporaneous returns-earnings relations for their full sample of industrial firms. They do find such evidence for mining firms. In light of Clinch et al.'s (2002) finding and Collins et al.'s (1994) conclusion that future earnings should be included in returns-earnings tests, our FERC specification takes on added importance.

Because Australian firms disclose both DM and IM statements, Clinch et al. (2002) are able to partition their sample based on the size of actual articulation errors, finding that DM disclosures are beneficial when articulation errors are large. While interesting, we do not want to condition on the size of actual articulation errors because in the U.S. setting,

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[12] Three recent studies document other factors associated with firms' FERC. Tucker and Zarowin (2006) find that current returns of higher income-smoothing firms contain more information about future earnings than the returns of lower income-smoothing firms. Ettredge et al. (2005) investigate the effect of adoption of SFAS No. 131 segment disclosure rules, finding that sample firms, other than single-segment firms that were unaffected by SFAS No. 131, experienced a significant increase in FERC after SFAS No. 131 adoption. Finally, Oswald and Zarowin (2007) document that an accounting choice, capitalizing or expensing R&D expenditures, is associated with firms' FERC in their sample of U.K. firms.

ex ante, accounting users do not know how large articulation errors will be when only IM statements are provided.[13]

III. RESEARCH DESIGN

Articulation Errors

Articulated estimates of DM components are calculated using the IM_SCF approach as well as the IM_BS approach following Krishnan and Largay (2000) and Livnat and Zarowin (1990).[14] These two types of articulated estimates are then compared with actual amounts reported in the DM statement of cash flows. Firms that disclose DM components follow SFAS No. 95 guidance and include cash received from customers and cash paid to suppliers and employees. For most firms these are the largest DM components. As mentioned earlier, we do not calculate articulation errors for either income tax paid or interest paid because these two components are required disclosures even when IM statements are reported (SFAS No. 95, para. 121). We also do not calculate articulation errors for miscellaneous cash receipts and payments. The definitions of miscellaneous receipts and payments vary from firm to firm, and year to year, and are thus difficult to estimate mechanically using IM disclosures. For many firms this line item is small relative to cash received from customers and cash paid to suppliers and employees.

Forecasting Future Cash Flows and Earnings

Our base CFO forecasting model is (firm subscripts omitted):

$$CFO_{t+1} = a_0 + b_1 CFO_t + \varepsilon_t \tag{1}$$

where we constrain the coefficients of the CFO components to be equal as in Barth et al. (2001) and Cheng and Hollie (2008). These studies use large samples of firms producing IM statements of cash flows while our sample is much smaller, including only firms producing DM cash flows. We deflate variables by average total assets for comparability with these prior studies.

We expand our base model creating a benchmark DM forecasting model using IM data. Our benchmark forecasting model is (firm subscripts omitted):

$$\begin{aligned} CFO_{t+1} = {} & a_0 + b_1 Est\_Sales_t + b_2 Est\_Supem_t + b_3 Dis\_Tax_t + b_4 Dis\_Int_t \\ & + b_5 Est\_Other_t + \varepsilon_t. \end{aligned} \tag{2}$$

Variables beginning with "*Est_*" are estimates calculated using either the IM_SCF or IM_BS methodologies. Variables beginning with "*Dis_*" are disclosed numbers. We use disclosed tax and interest payments (Dis_Tax_t and Dis_Int_t) rather than estimate them because they are required disclosures regardless of whether the IM or DM is presented.

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[13] Further, we argue that the results of Clinch et al. (2002) may not readily extrapolate to U.S. firms as there are differences in disclosure practices between U.S. and Australian firms. For example, while U.S. firms are required to disclose cash paid for taxes and cash paid for interest when they present the IM statement of cash flows, these supplemental disclosures to the IM were not considered in Clinch et al.'s (2002) Australian tests. Instead their study estimates cash paid for taxes and cash paid for interest and includes differences between these estimates and actual reported amounts when testing for equality of DM components.

[14] For example, Krishnan and Largay (2000) estimate cash collected from customers as sales minus change in account receivable. Since they use the IM_BS approach, change in account receivable is obtained from comparative balance sheets. The IM_SCF approach obtains the change in account receivable from IM statements of cash flows.

Est_Sales_t is estimated cash received from customers. Est_Supem_t is estimated cash paid to suppliers and employees. Est_Other_t is a plug figure, taking disclosed CFO_t less the sum of Est_Sales_t, Est_Supem_t, Dis_Tax_t, and Dis_Int_t. Model (2) includes information available to investors when only IM statements are presented. The included independent variables match those listed in SFAS No. 95's "Illustrative Examples" and paragraph 27.[15]

We expand benchmark model (2) to test for the statistical significance of articulation errors, expecting model (3) to improve upon model (2) performance because it includes extra information available from DM disclosures (firm subscripts omitted).

$$\begin{aligned} CFO_{t+1} = {} & a_0 + b_1 Est\_Sales_t + b_2 Est\_Supem_t + b_3 Dis\_Tax_t + b_4 Dis\_Int_t \\ & + b_5 Dis\_Other_t + b_6 Sales\_Err_t + b_7 Supem\_Err_t + \varepsilon_t. \end{aligned} \tag{3}$$

Our variables of interest are $Sales\_Err_t$ and $Supem\_Err_t$ where $Sales\_Err_t$ ($Supem\_Err_t$) indicates the actual cash received from customers (cash paid to suppliers and employees) as disclosed in DM statements minus the corresponding estimate calculated under either the IM_SCF or IM_BS approach. These variables represent incremental information available from the DM format. Model (3) includes the actual disclosed other amount, Dis_Other_t (known when the DM components are disclosed) in place of Est_Other_t used in model (2). Est_Other_t is a plugged amount reconciling IM disclosures to CFO in the benchmark model when actual DM components are not known and by definition would incorporate $Sales\_Err_t$ and $Supem\_Err_t$.

Similarly, we also estimate future earnings prediction models because DM disclosure is argued to improve prediction of future operating performance and earnings is a summary measure of such performance. Our base model follows from specifications used in prior studies, including Sloan (1996), whereby future earnings is forecasted based on current accruals and CFO. We extend this model by decomposing current CFO into DM components and related articulation errors:

$$EARN_{t+1} = a_0 + b_1 ACC_t + b_2 CFO_t + \varepsilon_t; \tag{4}$$

$$\begin{aligned} EARN_{t+1} = {} & a_0 + b_1 ACC_t + b_2 Est\_Sales_t + b_3 Est\_Supem_t + b_4 Dis\_Tax_t \\ & + b_5 Dis\_Int_t + b_6 Est\_Other_t + \varepsilon_t; \end{aligned} \tag{5}$$

$$\begin{aligned} EARN_{t+1} = {} & a_0 + b_1 ACC_t + b_2 Est\_Sales_t + b_3 Est\_Supem_t + b_4 Dis\_Tax_t \\ & + b_5 Dis\_Int_t + b_6 Dis\_Other_t + b_7 Sales\_Err_t \\ & + b_8 Supem\_Err_t + \varepsilon_t; \end{aligned} \tag{6}$$

where *EARN* is income before extraordinary items and *ACC* is operating accruals, calculated as *EARN* minus *CFO*. Both variables are deflated by average total assets.

Returns Tests

We employ several versions of the FERC model of Collins et al. (1994), Lundholm and Myers (2002), and particularly Tucker and Zarowin (2006) to explore whether firms producing DM statements exhibit higher FERC than firms only producing IM statements. Our primary model is (firm subscripts omitted):

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[15] Our specification differs from Cheng and Hollie's (2008) for the cash paid to suppliers and employees line item. They instead estimate cash flows for cost of goods sold (by adjusting cost of goods sold by the change in inventory and change in accounts payable) and cash flows for operating and administrative expenses. We choose not to pursue the same categories as Cheng and Hollie (2008) because their categorization scheme does not reflect the information that DM disclosing firms provide.

$$R_t = a_0 + b_1X_{t-1} + b_2X_t + b_3X_{t3} + b_4R_{t3} + b_5DM_t + b_6DM_t{*}X_{t-1} + b_7DM_t{*}X_t + b_8DM_t{*}X_{t3} + b_9DM_t{*}R_{t3} + \text{controls} + \varepsilon_t \tag{7}$$

where R_t is annual common stock return starting from three months after $t-1$ fiscal year-end; X_{t-1} and X_t are annual earnings for fiscal year $t-1$ and t, respectively; X_{t3} is the sum of earnings for fiscal years $t+1$ through $t+3$; and R_{t3} is common stock return for the three-year period starting from three months after t fiscal year-end.

Earnings are defined as income available to common shareholders before extraordinary items, and are deflated by market value of equity three months after $t-1$ fiscal year-end. Often ΔX_t is used in the price-earnings relation under the assumption that earnings follow a random walk. Rather than restrict the specification by this assumption, we follow Lundholm and Myers (2002) and include X_{t-1} and X_t in the model. A random walk is a special case in this specification when $b_1 = -b_2$. Based on prior studies, we expect b_1 to be negative and b_2 and b_3 to be positive. The more that current return incorporates information about future earnings, the higher the expected coefficient on X_{t3}. For return measures, we incorporate a three-months lag to ensure that the financial statements have been released. Following Lundholm and Myers (2002) and Tucker and Zarowin (2006), we combine three future years' earnings in X_{t3} and three future years' returns in R_{t3} to increase the power of the test.

Collins et al. (1994) assert that the theoretically correct independent variable is expected future earnings not actual earnings. An errors-in-variables situation results whereby X_{t3} reflects events occurring in $t+1$ through $t+3$ but not anticipated in period t. Collins et al. (1994) argue that including future returns, represented by R_{t3}, acts as a control variable for this measurement error, and they expect a negative coefficient because future returns are correlated with the unexpected component of future earnings. This specification better approximates changes in expectations of future earnings occurring during period t. To test H2, we include a dummy variable, DM_t, set equal to 1 if a firm uses the DM format during period t, and 0 otherwise, and we interact DM_t with the earnings variables and future return variable.

Our coefficient of interest is b_8. This coefficient captures the effect on FERC of DM disclosures. We predict b_8 to be positive if DM statements enhance the market's ability to predict future earnings as hypothesized.[16] We add an interaction variable, $DM_t{*}R_{t3}$, to control for a possible differential effect of measurement errors for DM firms.

Although earnings are positively correlated with CFO, a primary purpose of the DM statement of cash flow is to better predict future firm cash flows (SFAS No. 95, para. 107). Thus, to examine whether the DM statement allows more information about future cash flows to be impounded in current stock price, we extend Equation (7) by decomposing earnings into its accrual and cash flow components and interacting each with DM_t, similar to a model used by Tucker and Zarowin (2006). The extended model is (firm subscripts omitted):

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[16] Coefficient b_7 is also of interest, measuring any incremental contemporaneous earnings response from DM disclosure. If DM disclosure strengthens the relation between current returns and current earnings by providing additional information for the analysis of current earnings, then coefficient b_7 would be positive. If DM disclosure causes a substitution away from current earnings toward future earnings, allowing current returns to depend more heavily on future earnings, then current earnings may become less relevant (Gelb and Zarowin 2002). Since the direction is not clear, we do not provide a prediction for this coefficient.

$$\begin{aligned} R_t = {} & \mathrm{a}_0 + \mathrm{b}_1 CFO_{t-1} + \mathrm{b}_2 CFO_t + \mathrm{b}_3 CFO_{t3} + \mathrm{b}_4 ACC_{t-1} + \mathrm{b}_5 ACC_t \\ & + \mathrm{b}_6 ACC_{t3} + \mathrm{b}_7 R_{t3} + \mathrm{b}_8 DM_t + \mathrm{b}_9 DM_t{*}CFO_{t-1} + \mathrm{b}_{10} DM_t{*}CFO_t \\ & + \mathrm{b}_{11} DM_t{*}CFO_{t3} + \mathrm{b}_{12} DM_t{*}ACC_{t-1} + \mathrm{b}_{13} DM_t{*}ACC_t \\ & + \mathrm{b}_{14} DM_t{*}ACC_{t3} + \mathrm{b}_{15} DM_t{*}R_{t3} + \text{controls} + \varepsilon_t \end{aligned} \tag{8}$$

where *CFO* represents the cash flow from operations component of earnings and *ACC* the accrual component. Both variables are deflated by the market value of equity. To the extent that DM statements help predict future cash flows, we predict b_{11} to be positive.

We include various control variables in Equations (7) and (8). Based on Lundholm and Myers (2002), Ettredge et al. (2005), Tucker and Zarowin (2006), Freeman (1987), and Ayers and Freeman (2003), we introduce the following control variables:

$SIZE_t$ = natural log of the market value of equity at the beginning of fiscal year t;
$LOSS_t$ = 1 if $X_{t+1} < 0$, and 0 otherwise;
$GROWTH_t$ = percentage growth in total assets from fiscal year t–1 to fiscal year t+1;
$EARNSTD_t$ = standard deviation of X for fiscal year t through t+3; and
$NANAL_t$ = natural log of 1 plus the number of analysts following the firm in the latest month prior to earnings announcement for fiscal year t.

We add $SIZE_t$ and the number of analysts following a firm ($NANAL_t$) to control for differences in information environments across sample firms. Larger firms tend to have richer information environments and are followed by more analysts. We control for differences in earnings persistence using a dummy variable, $LOSS_t$. Negative future earnings would be more difficult to predict than positive earnings that are more likely to be normal and persistent. We include a firm growth variable ($GROWTH_t$) because high-growth firms tend to have more of their value from future earnings (i.e., a higher FERC). Last, we include a proxy for volatility of future earnings ($EARNSTD_t$) as volatile earnings are more difficult to predict.

Self-Selection Issues in Returns Tests

As pointed out earlier, a crucial issue for any test of the effects of accounting choice, especially for our return tests, is self-selection (Oswald and Zarowin 2007). A firm's choice between DM versus IM disclosure may introduce self-selection bias into our observed sample when we compare FERCs between DM and IM samples. We econometrically control for the bias in following two ways. First, we use a two-stage approach of Heckman (1979) and Lee (1979). In the first stage, we estimate the likelihood of a firm reporting the DM statement as a probit model (see Appendix B) and, using the parameters from this model, calculate the inverse Mills ratio for all firm-year observations. In the second stage, we include this ratio in our FERC regression models as a control, allowing its coefficient to vary between the DM and IM observations. This approach is widely used to control for the likelihood of self-selecting into an accounting method in prior studies (e.g., Ball and Shivakumar 2005; Leuz and Verrecchia 2000; Oswald and Zarowin 2007). We discuss results in Section V.

Second, we perform tests using a matched sample based on the predicted probabilities to disclose a DM statement from the first-stage probit regression. This approach, known as propensity score matching (LaLonde 1986), is potentially an improvement over simple matching on single variable such as size, profitability, etc., because it considers all predictive variables together to estimate a propensity to adopt the DM. The IM sample in this matching scheme includes those observations with propensity scores closest to our DM disclosing firms.

Further, we perform two additional self-selection tests. We first examine differences in FERC during the pre-SFAS No. 95 adoption period between firms that later chose either the DM or IM upon adoption of SFAS No. 95. We expect no differences if self-selection is not a concern. In addition, using a subsample of firms that did not produce DM statements in every year of our sample period, we examine whether DM disclosure is associated with higher FERC only when those firms disclose DM statements for the fiscal year. We also discuss these tests in Section V.

IV. DATA AND DESCRIPTIVE STATISTICS

Data and Sample Selection

The initial sample of firms publishing DM statements of cash flows was drawn from Lexis-Nexis™.[17] Table 1, Panel A documents that initially there were 507 firms that had produced 2,198 DM statements of cash flows over the fiscal years 1989 through 2002 sample period. The sample starts from 1989 because fiscal year 1988 was the first year firms were required by SFAS No. 95 to produce a statement of cash flows and our specification requires previous year cash flow data. The sample ends in 2002 because we require three years subsequent earnings and returns information. Financial firms producing DM statements were eliminated because many were banks and subject to regulatory disclosures beyond SFAS No. 95. Numerous firms and observations were eliminated due to data constraints on the Compustat and CRSP databases. To minimize the effect of outliers, we follow Tucker and Zarowin (2006) and delete observations that are in the top or bottom 1 percent of the distributions of the following variables from the available full sample (described below): past, current, and future three years' earnings, operating cash flows, and accruals as well as those for current and future three years' returns.

The final DM sample consists of 119 firms producing 604 DM statements of cash flows. Panel B of Table 1 documents the sample distribution by year. DM observations have generally been decreasing on a year by year basis from 206 observations in 1989 to 95 observations in 2002.[18] We also create a full sample (n = 39,255) which includes all firm-year observations, regardless of whether producing a DM statement of cash flows, that are not financial firms, and have available Compustat and CRSP data items, excluding outliers. Once data requirements and financial industry membership are considered, approximately 2–3 percent of firm-year observations in the full sample include a DM disclosure with the percentage decreasing through time to 0.48 percent in 2002. These percentages are in line with the 2–3 percent reported in Krishnan and Largay (2000). We were not readily able to determine why the number of firms disclosing DM statements has been decreasing. Unreported results indicate that DM firms represent a variety of industries and are not concentrated in a single or small number of industries.

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[17] The search algorithm is available upon request.

[18] A number of firms in our DM sample switched either to or from the DM during our sample period. We attempted, unsuccessfully, to identify underlying reasons for the switch as they offered no explicit explanation.

TABLE 1
Sample Selection and Distribution

Panel A: Sampling Process

	Number of Firms	Number of Observations
Initial DM sample identified from LexisNexis™ for fiscal years from 1989 to 2002	507	2,198
Less: Financial industry	(143)	(524)
Compustat data requirements	(146)	(461)
CRSP data requirements	(88)	(590)
Outliers	(11)	(19)
Final DM sample	119	604

Panel B: Sample Distribution by Year

Fiscal Year	Number in Initial DM Sample	Number of Final DM Sample in Full Sample	Number in Full Sample	Percent of Final DM Sample in Full Sample
1989	206	59	2,079	2.84%
1990	169	56	2,180	2.57%
1991	167	59	2,202	2.68%
1992	166	60	2,402	2.50%
1993	160	61	2,871	2.12%
1994	152	56	3,097	1.81%
1995	182	49	3,026	1.62%
1996	212	49	3,046	1.61%
1997	176	38	3,126	1.22%
1998	143	38	3,166	1.20%
1999	131	26	3,008	0.86%
2000	135	23	3,144	0.73%
2001	104	16	3,012	0.53%
2002	95	14	2,896	0.48%
Total	2,198	604	39,255	1.54%

The full sample consists of all nonfinancial industry firm year observations that satisfy all CRSP and Compustat data requirements, exclusive of outliers.

Descriptive Statistics

Table 2, Panel A compares the DM firms (n = 604) to IM firms in the full sample (n = 38,651) (full sample of 39,255 less 604 DM observations). The primary difference between DM firms and IM firms is size. A Wilcoxon rank-sum test and t-test on $SIZE_t$ are both significant at less than 1 percent, indicating that overall DM firms are smaller than IM firms. The difference in number of analysts following a firm, $NANAL_t$, is also significant at less than 1 percent as the number increases with firm size in general. Other variables are statistically similar across the two samples. Overall, the univariate comparison indicates that our DM firms do not follow typical characteristics of high-disclosure firms documented in prior literature. While Lang and Lundholm (1993) find that high-disclosure firms are

TABLE 2
Sample Statistics

Panel A: Full Sample Comparisons[a]

Variable	DM Firm-Year Obs. (n = 604)		IM Firm-Year Obs. (n = 38,651)		Difference	
	Mean	Median	Mean	Median	t-test p-value	Wilcoxon p-value
R_t	0.1668	0.0416	0.1361	0.0271	0.2946	0.3667
X_{t-1}	0.0178	0.0462	0.0170	0.0425	0.9019	0.1892
X_t	0.0250	0.0498	0.0181	0.0463	0.3241	0.8337
X_{t3}	0.1190	0.1563	0.0887	0.1363	0.1935	0.1008
R_{t3}	0.5561	0.2336	0.5143	0.2135	0.4371	0.5114
$SIZE_t$	4.5512	4.4106	5.4293	5.2588	0.0001	0.0001
ROA_t	0.0175	0.0418	0.0025	0.0406	0.0400	0.7424
LEV_t	0.1829	0.1019	0.1754	0.1319	0.3210	0.0041
$LOSS_t$	0.2467	0.0000	0.2860	0.0000	0.1138	0.1338
$GROWTH_t$	31.1759	17.2691	43.4989	16.7531	0.1377	0.6813
$EARNSTD_t$	0.0798	0.0508	0.0919	0.0469	0.1471	0.1892
$NANAL_t$	1.0898	1.0986	1.3776	1.3863	0.0001	0.0001

(continued on next page)

TABLE 2 (continued)

Panel B: Size-Matched Sample Comparisons^{b}

	DM Firm-Year Obs. (n = 604)		Matched IM Firm-Year Obs. (n = 604)		Difference	
Variable	**Mean**	**Median**	**Mean**	**Median**	**t-test p-value**	**Wilcoxon p-value**
R_t	0.1668	0.0416	0.1818	0.0769	0.7572	0.2717
X_{t-1}	0.0178	0.0462	0.0221	0.0442	0.6368	0.7724
X_t	0.0250	0.0498	0.0364	0.0501	0.2634	0.9539
X_{t3}	0.1190	0.1563	0.1187	0.1378	0.9957	0.3855
R_{t3}	0.5561	0.2336	0.5522	0.2148	0.9349	0.6026
$SIZE_t$	4.5512	4.4106	4.6017	4.4796	0.6247	0.5245
ROA_t	0.0175	0.0418	0.0163	0.0356	0.2580	0.1481
LEV_t	0.1829	0.1019	0.1734	0.1189	0.4710	0.3253
$LOSS_t$	0.2467	0.0000	0.2747	0.0000	0.2627	0.2625
$GROWTH_t$	31.1759	17.2691	56.8126	18.1379	0.0130	0.6855
$EARNSTD_t$	0.0798	0.0508	0.1027	0.0592	0.0400	0.1177
$NANAL_t$	1.0898	1.0986	1.0710	1.0986	0.5876	0.7678

(*continued on next page*)

TABLE 2 (continued)

Panel C: Propensity Score Matched Sample Comparisons[c]

Variable	DM Firm-Year Obs. (n = 486)		Matched IM Firm-Year Obs. (n = 486)		Difference	
	Mean	Median	Mean	Median	t-test p-value	Wilcoxon p-value
R_t	0.1706	0.0416	0.1634	0.0542	0.8633	0.8980
X_{t-1}	0.0219	0.0483	0.0321	0.0501	0.1708	0.4417
X_t	0.0296	0.0515	0.0306	0.0579	0.9032	0.1726
X_{t3}	0.1377	0.1622	0.1123	0.1597	0.3286	0.8980
R_{t3}	0.5703	0.2549	0.4425	0.2330	0.1060	0.7002
$SIZE_t$	4.5840	4.3861	4.7178	4.5594	0.2472	0.1997
ROA_t	0.0278	0.0422	0.0319	0.0478	0.6309	0.1544
LEV_t	0.1914	0.1100	0.1808	0.1123	0.4580	0.7005
$LOSS_t$	0.2263	0.0000	0.2428	0.0000	0.5433	0.5450
$GROWTH_t$	31.2805	18.3012	32.9409	15.9473	0.7238	0.3050
$EARNSTD_t$	0.0763	0.0509	0.0805	0.0451	0.4972	0.1584
$NANAL_t$	1.1208	1.0986	1.1236	1.0986	0.9654	0.9695

(*continued on next page*)

TABLE 2 (continued)

Panel D: Pearson Correlation (Full Sample)[d]

Variable	R_t	X_{t-1}	X_t	X_{t3}	R_{t3}	$SIZE_t$	ROA_t	LEV_t	$LOSS_t$	$GROWTH_t$	$EARNSTD_t$	$NANAL_t$
R_t												
X_{t-1}	−0.043 (0.001)											
X_t	0.136 (0.001)	0.545 (0.001)										
X_{t3}	0.069 (0.001)	0.399 (0.001)	0.521 (0.001)									
R_{t3}	−0.141 (0.001)	−0.039 (0.001)	−0.044 (0.001)	0.229 (0.001)								
$SIZE_t$	−0.066 (0.001)	0.223 (0.001)	0.174 (0.001)	0.151 (0.001)	−0.053 (0.001)							
ROA_t	0.130 (0.001)	0.283 (0.001)	0.486 (0.001)	0.285 (0.001)	−0.006 (0.255)	0.163 (0.001)						
LEV_t	−0.052 (0.001)	−0.015 (0.001)	−0.029 (0.001)	0.018 (0.001)	0.013 (0.009)	0.134 (0.001)	−0.009 (0.089)					
$LOSS_t$	−0.159 (0.001)	−0.263 (0.001)	−0.371 (0.001)	−0.457 (0.001)	−0.068 (0.001)	−0.186 (0.001)	−0.427 (0.001)	−0.033 (0.001)				
$GROWTH_t$	0.183 (0.001)	0.004 (0.475)	0.031 (0.001)	−0.103 (0.001)	−0.048 (0.001)	−0.004 (0.470)	0.011 (0.030)	−0.024 (0.001)	−0.003 (0.561)			
$EARNSTD_t$	0.148 (0.001)	−0.117 (0.001)	−0.198 (0.001)	−0.277 (0.001)	0.050 (0.001)	−0.193 (0.001)	−0.138 (0.001)	0.064 (0.001)	0.185 (0.001)	0.138 (0.001)		
$NANAL_t$	0.036 (0.001)	0.155 (0.001)	0.143 (0.001)	0.120 (0.001)	−0.025 (0.138)	0.765 (0.001)	0.206 (0.001)	0.115 (0.001)	−0.214 (0.001)	0.026 (0.001)	−0.184 (0.001)	

(continued on next page)

TABLE 2 (continued)

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[a] The p-values for differences in means (t-test) and medians (Wilcoxon Rank-sum test) are based on two-tailed tests. The IM firm-year observation sample (n = 38,651) is the full sample (n = 39,255) less DM sample (n = 604).

[b] The p-values for differences in means (t-test) and medians (Wilcoxon Rank-sum test) are based on two-tailed tests. Matched IM firm-year observations are obtained by matching based on fiscal year, two-digit SIC, and size.

[c] The p-values for differences in means (t-test) and medians (Wilcoxon Rank-sum test) are based on two-tailed tests. Matched IM firm-year observations are obtained by matching based on fiscal year, two-digit SIC, and the predicted probability from the probit regression on the decision to report direct method (DM) cash flow statements (i.e., propensity score matching). See Appendix B for details. 118 observations in the final DM sample (n = 604) were dropped due to missing variables for the probit model, leaving 486 matching observations.

[d] Two-tailed p-values are presented in parentheses.

Variable Definitions:

R_t = annual (monthly compounded) stock return for the 12-month period starting three months after $t-1$ fiscal year-end;
X_{t-1} = income available to common shareholders before extraordinary items in fiscal year $t-1$ deflated by the market value of equity three months after $t-1$ fiscal year-end;
X_t = income available to common shareholders before extraordinary items in fiscal year t deflated by the market value of equity three months after $t-1$ fiscal year-end;
X_{t3} = sum of income available to common shareholders before extraordinary items for fiscal year $t+1$ through $t+3$ deflated by the market value of equity three months after $t-1$ fiscal year-end;
R_{t3} = monthly compounded stock return for the three-year period starting three months after year t fiscal year-end;
$SIZE_t$ = natural log of the market value of equity at the beginning of fiscal year t (in $ millions);
ROA_t = income available to common shareholders before extraordinary items in fiscal year t deflated by the average total assets of fiscal year-ends $t-1$ and t;
LEV_t = long-term debt deflated by total assets at fiscal year-end t;
$LOSS_t$ = 1 if $X_{t+1} < 0$, and 0 otherwise;
$GROWTH_t$ = percentage growth in total assets from fiscal year $t-1$ to fiscal year $t+1$;
$EARNSTD_t$ = standard deviation of X for fiscal year t through $t+3$; and
$NANAL_t$ = natural log of 1 plus the number of analysts following a firm in the latest month prior to earnings announcement for fiscal year t from the I/B/E/S disclosure.

larger in size, more profitable, faster growing, and have higher stock returns than low-disclosure firms, our DM firms are smaller, and have similar levels of stock returns, profitability, and growth when compared to IM sample firms.

Panel B of Table 2 compares DM firms means and medians with size matched IM firms. Matching was made by fiscal year, two-digit SIC code, and size. Matching on industry (two-digit SIC code) helps control for earnings timeliness (important for our FERC tests) since firms in the same industry are more homogenous in their real activities and employ similar accounting disclosure methods (Gelb and Zarowin 2002). Matching on size was made because it is the most significant difference in the full sample comparisons (Table 2, Panel A). Comparison with the matched sample shows that only the mean standard deviation of earnings, $EARNSTD_t$, is significantly higher for IM matched firms. We control for $EARNSTD_t$ in our FERC tests.

As discussed earlier, we also obtain a propensity score matched sample using the predicted probabilities from the first-stage probit model as a control for self-selection bias. The determinant variables in the probit model and results are presented in Appendix B.[19] Panel C of Table 2 compares DM sample means and medians with the propensity score matched IM sample. Matching was made by fiscal year, two-digit SIC code, and the predicted probability from the probit regression.[20] Because some of our DM sample firms do not have required data for the probit model in Appendix B, the matched sample includes 486 DM observations, slightly fewer than the DM firm sample in Panels A and B. The panel shows that none of the variables are significantly different between the two subsamples. Concerns about self-selection bias should be alleviated by using the propensity score matched sample in FERC tests.

Pairwise Pearson correlations between our FERC regression variables using the full sample are presented in Table 2, Panel D. Returns, R_t, are positively correlated with current and future earnings (X_t and X_{t3}), as expected. Returns are negatively correlated with past earnings, X_{t-1}, in line with Lundholm and Myers (2002) and the mean-reverting nature of earnings. As expected, future returns, R_{t3}, are positively correlated with future earnings, X_{t3}. However, one concern is the significant negative correlation between current returns, R_t, and future returns, R_{t3}, at -0.141 with a p-value of 0.001. Ideally R_{t3} would have no correlation with R_t since its role is to mitigate measurement error introduced when actual future earnings are used as an observable proxy for unobservable expected earnings. This correlation result does not appear to be an artifact of the large sample size ($n = 39{,}255$). The correlations of R_t with R_{t3} for our smaller size matched sample ($n = 1{,}208$) or propensity score matched sample ($n = 972$) were similar (-0.138 and -0.155, respectively, with p-values < 0.001). As a result, future returns may influence our regression results beyond their role as a measurement error proxy. Tucker and Zarowin (2006, Table 2, Panel B) also show a negative correlation between these variables. Other correlations are as expected.

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[19] Considering costs and benefits of DM disclosure, we identified five categories of determinants, described in detail in Appendix B. These categories are: (1) costs to produce the DM statement; (2) proprietary costs of disclosure; (3) benefits stemming from reduction in agency costs related to ownership structure and debt level; (4) benefits of disclosure when firms raise capital; and (5) benefits of disclosure for firms with efficient operations relative to peers. Most variables in each category are significant with expected signs. Overall, the probit model categorizes 78.3 percent of our observations correctly.

[20] We match on industry (before matching on the predicted probability from the probit regression) because we want to control for earnings timeliness. Our main results are qualitatively the same when we obtain a propensity score matched sample based on matching made by fiscal year and the predicted probability or only by the predicted probability.

V. EMPIRICAL RESULTS

Articulation Errors

The number of observations in our original DM sample is 604. Observations in Table 3, Panels A and B are slightly lower due to missing data items in Compustat needed to calculate articulation errors.[21]

Panel A of Table 3 reports that the median (mean) IM_SCF articulation error for $abs(Sales\_Err_t)$ is 0.0041 (0.0239). The median (mean) articulation error for $abs(Supem\_Err_t)$ is 0.0185 (0.0508), and the median (mean) for $abs(Err_t)$ is 0.0264 (0.0719). These error amounts are scaled by average total assets. The mean signed value of $Sales\_Err_t$

TABLE 3
Articulation Errors in DM Sample

Panel A: Articulation Errors in DM Sample (IM_SCF Approach)

Variable	n	Mean	Std. Dev.	5%	25%	50%	75%	95%
$Sales\_Err_t$	547	−0.0065	0.0698	−0.0572	−0.0054	0.0000	0.0019	0.0386
$abs(Sales\_Err_t)$	547	0.0239	0.0659	0.0000	0.0003	0.0041	0.0180	0.1070
$Supem\_Err_t$	437	−0.0082	0.1202	−0.1419	−0.0163	−0.0008	0.0233	0.1093
$abs(Supem\_Err_t)$	437	0.0508	0.1093	0.0009	0.0071	0.0185	0.0493	0.2041
$abs(Err_t)$	437	0.0719	0.1479	0.0016	0.0105	0.0264	0.0631	0.3217

Panel B: Articulation Errors in DM Sample (IM_BS Approach)

Variable	n	Mean	Std. Dev.	5%	25%	50%	75%	95%
$Sales\_Err_t$	575	−0.0015	0.0902	−0.0754	−0.0093	0.0000	0.0069	0.0620
$abs(Sales\_Err_t)$	575	0.0319	0.0843	0.0000	0.0012	0.0080	0.0281	0.1205
$Supem\_Err_t$	470	−0.0066	0.1250	−0.1423	−0.0162	−0.0009	0.0229	0.1083
$abs(Supem\_Err_t)$	470	0.0524	0.1136	0.0011	0.0079	0.0186	0.0498	0.2653
$abs(Err_t)$	470	0.0789	0.1497	0.0025	0.0126	0.0318	0.0734	0.3528

In Panel A, when we estimate articulation errors, we refer to the indirect method statement of cash flows for the information regarding changes in accounts receivable, changes in inventory, and changes in accounts payable.

In Panel B, articulated numbers are estimated based on the information in balance sheet and income statement only following Krishnan and Largay (2000) and Livnat and Zarowin (1990).

Variable Definitions:

Sales_Err = actual cash received from customers obtained from the direct method statement of cash flows minus the articulated number, deflated by average total assets;

Supem_Err = actual cash paid to suppliers and employees obtained from the direct method statement of cash flows (denoted as a negative number) minus the articulated number, deflated by average total assets;

abs(Sales_Err) and *abs(Supem_err)* = the absolute values of *Sales_Err* and *Supems_Err*, respectively; and

abs(Err) = the sum of *abs(Sales_err)* and *abs(Supem_err)*.

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[21] When we estimate DM items of cash received from customers and cash paid to suppliers and employees using either the IM_SCF approach or the IM_BS approach, some corresponding data items are missing or combined into other data items in Compustat for a nontrivial number of DM firms. We exclude those observations from analyses for Tables 3 and 4.

(*Supem_Err*$_t$) is −0.0065 (−0.0082) which is, not surprisingly, close to zero because articulation may cause either under-estimation or over-estimation of DM components.[22]

The evidence suggests that there is a substantial aggregation of, and reclassifications between, components that cause IM_SCF approach articulation errors. Untabulated results indicate that the IM_SCF approach articulation errors are pervasive. About 69 percent of the sample generates an absolute difference between actual cash received from customers (disclosed in the DM statement) and the articulated estimate higher than $100,000. About 91 percent of the sample generates an absolute difference between actual cash paid to suppliers and employees (disclosed in the DM statement) and the articulated estimate higher than $100,000.[23]

Median articulation errors are smaller than means, as in Krishnan and Largay (2000), indicating a small number of observations with large articulation errors. Because of this skewness, we examine whether our prediction and FERC test results are driven by these observations in the following section.

Panel B of Table 3 reports higher articulation errors from the IM_BS approach. Similar to Panel A, the averages of *Sales_Err*$_t$ and *Supem_Err*$_t$ are negative. The median (mean) articulation error for *abs(Sales_Err*$_t$*)* is 0.0080 (0.0319). The median (mean) articulation error for *abs(Supem_Err*$_t$*)* is 0.0186 (0.0524) and the median (mean) for *abs(Err*$_t$*)* is 0.0318 (0.0789).

Comparing Table 3, Panels A and B, we find that articulation errors calculated with the IM_SCF approach are smaller than the IM_BS approach. When we perform a t-test for a difference in mean values of *abs(Sales_Err*$_t$*)* from Panels A and B, the difference is significant (t-value = 4.17 and p-value < 0.001). For *abs(Supem_Err*$_t$*)* and *abs(Err*$_t$*)*, a t-value of the difference is 1.75 (p-value = 0.082) and 4.63 (p-value < 0.001), respectively. Wilcoxon rank-sum tests for the differences are also significant. These results indicate that the IM_SCF approach yields significantly lower articulation errors than the IM_BS approach as expected. More importantly, however, we find that articulation errors still extensively exist for the IM_SCF approach. This implies that DM statements are not redundant, confirming the CFA Institute's viewpoint.

Forecasting Future Cash Flows and Earnings

Table 4 presents results for our future cash flows and earnings prediction models using IM_SCF and IM_BS estimates. We scale all variables by average total assets to compare with Cheng and Hollie (2008) and Barth et al. (2001). Panel A documents results of our CFO prediction models. Our models exhibit higher adjusted R^2 than prior studies. The higher adjusted R^2s of 0.4375 to 0.5173 for our models compare with adjusted R^2s of 0.3170 to 0.3983 for Cheng and Hollie (2008) and 0.2400 to 0.3500 for Barth et al. (2001). We also report higher coefficients on *CFO*$_t$ (0.7805 and 0.7814) compared to 0.616 reported by Cheng and Hollie (2008). Our higher reported coefficients and R^2 statistics appear due to our outlier truncation procedures described in Section IV. Since results are qualitatively

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[22] Note that actual and estimated cash received amounts (cash inflows) are shown as positive numbers, while actual and estimated cash paid amounts (cash outflows) are shown as negative numbers. *Sales_Err* is actual cash received from customers in DM statements minus the articulated number, deflated by average total assets. *Supem_Err* is actual cash paid to suppliers and employees in DM statements (denoted as a negative number) minus the articulated number, deflated by average total assets.

[23] We checked whether signed articulation errors tend to mean revert by examining their auto-correlations. We find both *Sales_Err*$_t$ and *Supem_Err*$_t$ are positively but insignificantly autocorrelated, suggesting that the articulation errors in one year are not cancelled out by errors with the opposite sign in the next year.

TABLE 4
Forecasting Future Cash Flows and Earnings

Panel A: Forecasting Future Cash Flows (CFO_{t+1})

	IM_SCF Statement of Cash Flows Approach (n = 437)			IM_BS Balance Sheet Approach (n = 470)		
Variable	**Model (1)**	**Model (2)**	**Model (3)**	**Model (1)**	**Model (2)**	**Model (3)**
Intercept	0.0050	−0.0125	−0.0118	0.0060	−0.0138	−0.0136
	(.464)	(.298)	(.328)	(.356)	(.230)	(.241)
CFO_t	0.7805			0.7814		
	(.001)			(.001)		
Est_Sales_t		0.7695	0.7711		0.7689	0.7702
		(.001)	(.001)		(.001)	(.001)
Est_Supem_t		0.7659	0.7669		0.7628	0.7632
		(.001)	(.001)		(.001)	(.001)
Dis_Int_t		0.1674	0.2031		0.2364	0.2846
		(.707)	(.681)		(.574)	(.541)
Dis_Tax_t		0.0936	0.1521		0.0687	0.0610
		(.842)	(.812)		(.908)	(.912)
Est_Other_t		0.5093			0.5424	
		(.001)			(.001)	
Dis_Other_t			0.4330			0.4679
			(.001)			(.001)
$Sales\_Err_t$			0.6582			0.6334
			(.001)			(.001)
$Supem\_Err_t$			0.6014			0.6316
			(.001)			(.001)
Adjusted R^2	0.4375	0.4579	0.4966	0.4569	0.4787	0.5173

Chi-square tests of coefficient equality:

	IM_SCF Model (2)	IM_SCF Model (3)	IM_BS Model (2)	IM_BS Model (3)
Coefficients on Est_Sales_t, Est_Supem_t, Dis_Int_t, Dis_Tax_t, and Est_Other_t in model (2) are equal (df. = 4)	21.78 (p = 0.001)		18.35 (p = 0.001)	
Coefficients on Dis_Other_t, $Sales\_Err_t$, and $Supem\_Err_t$ in model (3) are equal (df. = 2)		7.51 (p = 0.023)		6.85 (p = 0.033)

(*continued on next page*)

TABLE 4 (continued)

Panel B: Forecasting Future Earnings ($EARN_{t+1}$)

	IM_SCF Statement of Cash Flows Approach (n = 437)			IM_BS Balance Sheet Approach (n = 470)		
Variable	**Model (1)**	**Model (2)**	**Model (3)**	**Model (1)**	**Model (2)**	**Model (3)**
Intercept	−0.0247	−0.0410	−0.0413	−0.0206	−0.0344	−0.0359
	(.001)	(.001)	(.001)	(.001)	(.003)	(.002)
ACC_t	0.9185	0.8701	0.8739	0.9318	0.9082	0.9086
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
CFO_t	1.1476			1.1131		
	(.001)			(.001)		
Est_Sales_t		1.1330	1.1326		1.1048	1.1016
		(.001)	(.001)		(.001)	(.001)
Est_Supem_t		1.1281	1.1282		1.0990	1.0957
		(.001)	(.001)		(.001)	(.001)
Dis_Int_t		1.2663	1.2437		1.3438	1.3112
		(.166)	(.175)		(.138)	(.149)
Dis_Tax_t		0.8235	0.7771		0.6108	0.5827
		(.550)	(.574)		(.658)	(.673)
Est_Other_t		0.8875			0.8573	
		(.001)			(.001)	
Dis_Other_t			0.7743			0.7267
			(.001)			(.001)
$Sales\_Err_t$			1.0357			1.0228
			(.001)			(.001)
$Supem\_Err_t$			0.9926			0.9450
			(.001)			(.001)
Adjusted R^2	0.4589	0.4716	0.4904	0.4545	0.4783	0.4940
Chi-square tests of coefficient equality:						
Coefficients on Est_Sales_t, Est_Supem_t, Dis_Int_t, Dis_Tax_t, and Est_Other_t in model (2) are equal (df. = 4)		17.23 (p = 0.002)			16.85 (p = 0.002)	
Coefficients on Dis_Other_t, $Sales\_Err_t$, and $Supem\_Err_t$ in model (3) are equal (df. = 2)			6.01 (p = 0.049)			5.96 (p = 0.051)

(*continued on next page*)

TABLE 4 (continued)

The IM_SCF (IM_BS) approach uses income statement and indirect method statement of cash flows (balance sheet) information.

All variables are deflated by average total assets. When estimating the coefficients' standard errors, we use a White (1980) procedure to correct for heteroscedasticity and a clustering procedure that accounts for serial dependence across years for a given firm.

Two-tailed p-values are presented in the parentheses.

Variable Definitions:

ACC = operating accruals, calculated as *EARN* minus *CFO*;
CFO = net cash flow from operations;
Dis_Int = disclosed cash interest payment (denoted as a negative number);
Dis_Other = *CFO* minus the sum of *Dis_Sales, Dis_Supem, Dis_Int,* and *Dis_Tax*;
Dis_Tax = disclosed cash tax payment (denoted as a negative number);
EARN = income before extraordinary items and discontinued operations;
Est_other = *CFO* minus the sum of *Est_Sales, Est_Supem, Dis_Int,* and *Dis_Tax*;
Est_Sales = the articulated estimate of cash received from customers;
Est_Supem = the articulated estimate of cash paid to suppliers and employees (denoted as a negative number);
Sales_Err = the articulation error for cash received from customers; and
Supem_Err = the articulation error for cash paid to suppliers and employees.

similar whether the IM_SCF or IM_BS approach is employed, we only discuss the IM_SCF results for brevity.[24]

Benchmark model (2) predicts one-year-ahead CFO with information available in IM statements. Coefficients on estimated cash received from customers (Est_Sales_t) and estimated cash paid to suppliers and employees (Est_Supem_t) are 0.7695 and 0.7659. Both are significant (p-values < 0.001). Decomposing CFO into estimated DM components improves explanatory power from 0.4375 to 0.4579. A Chi-square test of equality of estimated DM components is rejected (p-value $= 0.001$), implying that the decomposition improves prediction of future CFO. Using much different samples, this result is similar to Cheng and Hollie (2008).

Model (3) includes articulation errors representing additional information provided by DM disclosure beyond estimates under the IM_SCF approach. Coefficients on articulation error terms, $Sales\_Err_t$ and $Supem\_Err_t$, are both significant (p-values < 0.001), indicating the errors aid in predicting future CFO beyond corresponding estimated components (Est_Sales_t and Est_Supem_t).[25] The coefficient values of 0.6582 and 0.6014, respectively, are not as large as those for Est_Sales_t and Est_Supem_t.[26] Importantly, a Chi-square test of coefficient equality for Dis_Other_t, $Sales\_Err_t$, and $Supem\_Err_t$ is rejected (p-value $= 0.023$), suggesting that misclassifying articulation errors into miscellaneous receipts and payments (Dis_Other_t) could lower prediction performance. Further, when we examine pairwise F-tests of coefficient equality between the components in model (3), we find that equalities between a core component (either Est_Sales_t or Est_Supem_t) and a non-core component (either Dis_Int, Dis_Tax_t, or Dis_Other_t) are always rejected, while those between core components or between Dis_Int and Dis_Tax_t are not rejected.[27]

Multiplying the coefficient on $Sales\_Err_t$ of 0.6582 in model (3) by 0.0041, the median value of $abs(Sales\_Err_t)$ as reported in Panel A of Table 3, translates into a 0.27 percent change in CFO as a percent of average total assets. Similarly, multiplying the coefficient on $Supem\_Err_t$ of 0.6014 by 0.0185, the median value of $abs(Supem\_Err_t)$, translates into a 1.11 percent change in CFO. The sum of these two percentages is attributable to a 1.38 percent change in future CFO as a percent of average total assets.[28] This change to CFO as a percent of total assets appears economically significant, considering the mean (median) of absolute percentage forecast errors for the CFO prediction model (2) is only 8.8 percent

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[24] The lower R^2 from the Table 4, Panel A IM_SCF model (2) (relative to IM_BS model (2)) is due to different samples. When we create an equal sample ($n = 433$) that allows estimation of errors under both approaches, adjusted R^2s of prediction models (2) and (3) under the IM_SCF approach are 0.4538 and 0.4877, respectively, similar to those under the IM_BS approach (0.4497 and 0.4981, respectively). The adjusted R^2 of model (1) is 0.4110 for both approaches. Importantly, we find that explanatory power significantly improves from model (2) to (3) under both approaches using this equal sample.

[25] We also conducted a Vuong (1989) test finding that the difference in explanatory power between models (2) and (3) is significant at less than 1 percent.

[26] When we performed F-tests of coefficient equality between Est_Sales_t and $Sales\_Err_t$ and between Est_Supem_t and $Supem\_Err_t$ coefficient differences were significant at 5 percent or less. This may be because error items related to netting or reclassifications have lower persistence when forecasting future CFO.

[27] Here we define cash received from customers and cash paid to suppliers and employees as core DM components as they have higher persistence in our results. In addition, when we auto-regress each actual DM component on the same prior year actual DM component, the coefficients on Dis_Sales_t, Dis_Supem_t, Dis_Int_t, Dis_Tax_t, and Dis_Other_t are 0.8665 ($p = 0.001$), 0.8568 ($p = 0.001$), 0.4048 ($p = 0.002$), 0.3872 ($p = 0.001$), and 0.4681 ($p = 0.031$) respectively. This result confirms our finding that core DM components have a more persistent nature.

[28] Alternatively, multiplying the coefficients on $Sales\_Err_t$ and $Supem\_Err_t$ by 0.0698 and 0.1202, a one standard deviation change in the respective variable, yields a 4.6 percent and a 7.2 percent change, respectively, in CFO as a percent of total assets. The sum of these percentages (11.8 percent) suggests an even bigger effect in our sample.

(4.8 percent) in our DM sample. Taken together, these results indicate that disclosing DM statements can potentially improve the prediction of future cash flows in a statistically and economically significant manner.

Table 4, Panel B shows results of our earnings prediction models. Results for the IM_BS approach are similar to the IM_SCF approach and not discussed for brevity. Model (1) shows that the coefficient on CFO_t is greater than the coefficient on ACC_t, suggesting that the cash component of earnings persists more into future earnings than the accrual component of earnings (Sloan 1996). Results from models (2) and (3) indicate that DM disclosures can enhance prediction of future earnings as well. Decomposing CFO into estimated DM components (i.e., model (2)) improves explanatory power from 0.4589 to 0.4716 and a Chi-square test rejects equality of estimated DM components (p-value < 0.002). Further decomposing CFO to include articulation errors (i.e., model (3)), coefficients on articulation error terms, $Sales\_Err_t$ and $Supem\_Err_t$, are both significant (p-values < 0.001). Similar to the CFO prediction results in Panel A, we find that a Chi-square test of coefficient equality for Dis_Other_t, $Sales\_Err_t$, and $Supem\_Err_t$ is rejected (p-value $= 0.049$) and that the results of Vuong (1989) tests across models are all significant at 1 percent or less.

As documented in Table 3, the means of absolute articulation errors are greater than the medians, indicating that there are a small number of observations with large articulation errors. To examine whether our results are driven by observations with large articulation errors, we drop observations falling into the top 10 percent of $abs(Err_t)$ for both the IM_SCF and IM_BS approaches and then re-estimate prediction models for CFO and earnings. We find that coefficients on $Sales\_Err_t$ and $Supem\_Err_t$ are significant in all cases with differences in explanatory powers across models still significant.[29]

In sum, our findings in Table 4 suggest that forecasting with actual DM components yields better predictions of future CFO and earnings than forecasts utilizing estimated DM components due to articulation errors. These results support our hypothesis H1 that DM statement information enhances predictability of CFO and earnings.

Returns Tests

Table 5 reports results from our FERC models. Panel A reports results for estimating Equation (7) without controls. Panel B presents results for Equation (8), decomposing earnings into cash flows and accruals while Panel C is Equation (7) with controls. Results are reported for the full sample (n = 39,255), size matched sample (n = 1,208) and propensity score matched sample (n = 972). As mentioned earlier, the size- (propensity score) matched sample was obtained by matching fiscal year, two-digit SIC code, and size (the predicted probability of disclosing a DM statement as estimated from the probit model in Appendix B).

Primary model results in Panel A are similar across all three samples. Prior period earnings, X_{t-1}, is negative and significant, as expected, while the coefficient on current earnings (the traditional ERC) is positive. In the full sample, the coefficient on past

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[29] For example, when we estimate CFO prediction models after eliminating 44 observations within the top 10 percent of $abs(Err_t)$ under the IM_SCF approach, the coefficients on $Sales\_Err_t$ and $Supem\_Err_t$ in model (3) are 0.5793 (p-value $= 0.0076$) and 0.5553 (p-value $= 0.0123$). Further, we still find a significant improvement in explanatory power from model (2) (adjusted $R^2 = 0.4494$) to model (3) (adjusted $R^2 = 0.4713$). The Chi-square test of coefficient equality for Dis_Other_t, $Sales\_Err_t$, and $Supem\_Err_t$ is rejected (p-value $= 0.067$). Results are similar with the IM_BS approach and with our earnings prediction models.

TABLE 5
Regressions of FERC Models

Panel A: Primary Models

Variable	**(1) Full Sample (n = 39,255)**	**(2) Size Matched Sample (n = 1,208)**	**(3) Propensity Score Matched Sample (n = 972)**
Intercept	0.1708	0.1923	0.1918
	(.001)	(.001)	(.001)
X_{t-1}	−0.7812	−1.7645	−1.3763
	(.001)	(.001)	(.001)
X_t	0.7725	1.6982	1.3969
	(.001)	(.001)	(.001)
X_{t3}	0.1016	−0.0319	0.1824
	(.001)	(.508)	(.007)
R_{t3}	−0.0864	−0.0535	−0.1323
	(.001)	(.007)	(.001)
DM_t	−0.0115	−0.0073	−0.0168
	(.717)	(.857)	(.705)
$DM_t * X_{t-1}$	−0.2036	0.7808	−0.0269
	(.426)	(.408)	(.948)
$DM_t * X_t$	0.2263	0.011	0.1597
	(.489)	(.342)	(.429)
$DM_t * X_{t3}$	0.2319	0.3673	0.1512
	(.008)	(.001)	(.002)
$DM_t * R_{t3}$	−0.0261	−0.0592	−0.0201
	(.272)	(.044)	(.179)
Adjusted R^2	0.0613	0.1425	0.1264

Panel B: Decomposed Earnings Models

Variable	**(1) Full Sample (n = 39,255)**	**(2) Size Matched Sample (n = 1,208)**	**(3) Propensity Score Matched Sample (n = 972)**
Intercept	0.1421	0.1901	0.1511
	(.001)	(.001)	(.001)
CFO_{t-1}	−1.0128	−2.1425	−1.6701
	(.001)	(.001)	(.001)
CFO_t	0.7963	1.8653	1.5860
	(.001)	(.001)	(.001)
CFO_{t3}	0.1649	−0.0051	0.3084
	(.001)	(.637)	(.014)
ACC_{t-1}	−0.7178	−1.5344	−1.2077
	(.001)	(.001)	(.001)
ACC_t	0.7272	1.4767	1.1268
	(.001)	(.001)	(.001)
ACC_{t3}	0.0231	−0.0542	0.2106
	(.010)	(.362)	(.017)
R_{t3}	−0.0909	−0.0549	−0.1341
	(.001)	(.006)	(.001)

(*continued on next page*)

TABLE 5 (continued)

Variable	(1) Full Sample (n = 39,255)	(2) Size Matched Sample (n = 1,208)	(3) Propensity Score Matched Sample (n = 972)
DM_t	−0.0141	−0.0595	−0.0194
	(.709)	(.214)	(.708)
$DM_t * CFO_{t-1}$	0.2704	0.7039	0.4628
	(.399)	(.182)	(.321)
$DM_t * CFO_t$	0.1924	0.0879	0.1587
	(.576)	(.321)	(.255)
$DM_t * CFO_{t3}$	0.2815	0.3915	0.1884
	(.004)	(.001)	(.002)
$DM_t * ACC_{t-1}$	−0.1284	0.6881	−0.0924
	(.630)	(.529)	(.834)
$DM_t * ACC_t$	0.1538	0.0714	0.1738
	(.653)	(.709)	(.715)
$DM_t * ACC_{t3}$	0.2304	0.3608	0.1633
	(.017)	(.001)	(.004)
$DM_t * R_{t3}$	−0.0268	−0.0628	−0.0187
	(.258)	(.033)	(.605)
Adjusted R^2	0.0717	0.1506	0.1346

Panel C: Primary Models with Control Variables

Variable	(1) Full Sample (n = 39,255)	(2) Size Matched Sample (n = 1,208)	(3) Propensity Score Matched Sample (n = 972)
Intercept	0.2718	0.0516	0.1219
	(.001)	(.466)	(.092)
X_{t-1}	−0.7285	−1.4766	−1.2901
	(.001)	(.001)	(.001)
X_t	0.6255	0.8620	1.1680
	(.001)	(.001)	(.001)
X_{t3}	0.5260	0.4309	0.4383
	(.001)	(.001)	(.008)
R_{t3}	−0.1055	−0.0861	−0.1612
	(.001)	(.001)	(.001)
DM_t	0.0079	0.0228	−0.0040
	(.787)	(.553)	(.918)
$DM_t * X_{t-1}$	−0.0416	0.6664	−0.1247
	(.860)	(.320)	(.733)
$DM_t * X_t$	0.0757	0.0854	0.1366
	(.802)	(.799)	(.733)
$DM_t * X_{t3}$	0.0823	0.1919	0.1674
	(.013)	(.008)	(.006)
$DM_t * R_{t3}$	−0.0167	−0.0419	−0.0378
	(.447)	(.129)	(.235)
$SIZE_t$	−0.0652	−0.0376	−0.0840
	(.001)	(.026)	(.001)
$SIZE_t * X_{t3}$	0.0454	0.0255	0.0952
	(.001)	(.264)	(.014)

(continued on next page)

TABLE 5 (continued)

Variable	(1) Full Sample (n = 39,255)	(2) Size Matched Sample (n = 1,208)	(3) Propensity Score Matched Sample (n = 972)
$LOSS_t$	−0.2159	−0.0950	−0.1061
	(.001)	(.057)	(.068)
$LOSS_t * X_{t3}$	−0.3341	−0.2640	−0.6488
	(.001)	(.003)	(.001)
$GROWTH_t$	0.0012	0.0007	0.0029
	(.001)	(.001)	(.001)
$GROWTH_t * X_{t3}$	0.0002	0.0004	0.0002
	(.001)	(.003)	(.068)
$EARNSTD_t$	0.8113	1.4906	1.8356
	(.001)	(.001)	(.001)
$EARNSTD_t * X_{t3}$	−0.0976	−0.6053	−0.2708
	(.002)	(.001)	(.030)
$NANAL_t$	0.1119	0.1058	0.1232
	(.001)	(.001)	(.007)
$NANAL_t * X_{t3}$	0.0343	0.1190	0.0275
	(.043)	(.062)	(.085)
Adjusted R^2	0.2002	0.2568	0.3464

When estimating the coefficients' standard errors, we use a White (1980) procedure to correct for heteroscedasticity and a clustering procedure that accounts for serial dependence across years for a given firm. Two-tailed p-values are presented in the parentheses.

Variable Definitions:

DM_t = 1 if the direct cash flows method is used for cash flow statements in fiscal year t, and 0 otherwise;
ACC_t = the total accruals in fiscal year t calculated by subtracting operating cash flows from net income before extraordinary items (Compustat #18) and deflating the variable by the market value of equity three months after $t-1$ fiscal year-end; and
CFO_t = cash flow from operations in fiscal year t, deflated by the market value of equity three months after $t-1$ fiscal year-end.

See Table 2 for the definitions of other variables.

earnings is −0.7812, and the coefficient on current earnings is 0.7725. These coefficients are of similar magnitude and opposite in sign, indicating that the market reacts to current earnings as if it closely follows a random walk.

Future earnings, X_{t3}, is positive and significant for the full sample and propensity score matched sample, but negative and insignificant for the size matched sample. It becomes positive and significant once control variables are added (Table 5, Panel C). The positive and significant coefficient indicates that future earnings information is incorporated into current stock price, in line with prior findings of Lundholm and Myers (2002) and Gelb and Zarowin (2002). The coefficient on future returns, R_{t3}, is negative and significant for each sample, as expected given its role to control for measurement error. Adjusted R^2 results for the primary model are 0.0613 to 0.1425, lower than adjusted R^2 results of 0.16 to 0.23 reported in Lundholm and Myers (2002) and Gelb and Zarowin (2002). As our study uses different samples, the difference in adjusted R^2 is not surprising. Our variable of main interest, $DM_t{*}X_{t3}$, has positive and significant coefficients with p-values of 0.008, 0.001, and 0.002 for all three samples. We interpret this result as supporting H2 that producing a

DM statement is associated with an increase in the market's ability to incorporate future earnings information into current stock returns.[30]

In Panel B of Table 5, each earnings variable has been decomposed into cash flows from operations, *CFO*, and accruals, *ACC*. Similar to the primary models, DM_t has been included and also interacted with *CFO* and *ACC* for each period. For each sample the coefficient on the variable $DM_t{*}CFO_{t3}$ is positive and significant (p-values of 0.004, 0.001, and 0.002), indicating that producing a DM statement is associated with an increase in stock price informativeness about future CFO as well. Coefficients range from 0.1884 for the propensity matched sample to a higher 0.3915 for the size matched sample. DM_t also interacts positively with ACC_{t3}, indicating that a DM statement is associated with an enhanced market's ability to incorporate future accruals into stock returns. Overall, adjusted R^2s for the decomposed models are slightly higher than for the primary models, ranging from 0.0717 to 0.1506. Similar to the results in Panel A, DM_t and the interaction variables, $DM_t{*}CFO_t$ and $DM_t{*}ACC_t$, are all insignificant. This suggests that the value of producing a DM statement of cash flows is captured mainly through the market's improved ability to forecast future earnings as well as the components of future earnings. This finding supports the views expressed in SFAS No. 95 and CFA Institute (2005) that the DM format is primarily useful for forecasting future firm performance.

However, we cannot rule out the possibility that the DM_t dummy variable may proxy for omitted factors from our primary model. To alleviate this concern, we include control variables in the primary model. The variables added include firm size ($SIZE_t$), whether a firm records a loss in period $t+1$ or not ($LOSS_t$), growth in firm assets ($GROWTH_t$), earnings volatility ($EARNSTD_t$), and number of analysts following a firm ($NANAL_t$). As can be seen in Panel C of Table 5, overall conclusions do not change when these control variables are added. The coefficients on $DM_t{*}X_{t3}$ are slightly lower than in Panel A, ranging from 0.0823 to 0.1919 (with p-values from 0.006 to 0.013) after including control variables. The dummy variable DM_t remains insignificant as does $DM_t{*}X_t$. We also find that while coefficients on X_{t3} are all significant, each control variable and its interaction with future earnings, X_{t3} (e.g., $SIZE_t{*}X_{t3}$, $LOSS_t{*}X_{t3}$, etc.) are generally significant with predicted signs. Adjusted R^2 increases substantially when these control variables are added, ranging from 0.2002 for the full sample to 0.3464 for the matched sample. Although not tabulated for brevity, we also find that our results for the decomposed earnings model (i.e., Equation (8)) are qualitatively similar when the control variables are added. For example, coefficients on $DM_t{*}CFO_{t3}$ using the three samples are 0.1111, 0.2501, and 0.2173 (p-values of 0.002, 0.003, and 0.003, respectively), while those on $DM_t{*}ACC_{t3}$ are 0.0542, 0.1488, and 0.1302 (p-values of 0.004, 0.004 and 0.005, respectively).[31]

Since some of control variables are highly correlated, which could cause a multicollinearity problem, we attempt to add control variables individually to the models (e.g., $SIZE_t$ and $SIZE_t{*}X_{t3}$ only are added to the model, then $LOSS_t$ and $LOSS_t{*}X_{t3}$ only are added to the model, etc.). Although not tabulated, results are qualitatively the same. When market-to-book value of equity is used as an alternative variable for $GROWTH_t$, the main results are unchanged.[32]

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[30] One may argue that our finding of higher FERC for DM firms could be due to lower value-relevance of current reported earnings (i.e., lower ERC) for DM firms. We note, however, that the estimated coefficients for $DM_t{*}X_t$ are statistically insignificantly different from zero, negating the argument. Further, when control variables are included in Table 5, Panel C, results are similar.

[31] The results for Equations (7) and (8) are obtained by pooled time-series regressions with the White (1980) procedure to correct for heteroscedasticity and a clustering procedure that accounts for serial dependence across years for a given firm. When we estimate the equations by the Fama and MacBeth (1973) approach to further mitigate potential bias in our standard errors, our inferences remain qualitatively similar.

In addition, we attempted to control for the overall level and quality of a firm's disclosures using S&P disclosure ratings and/or AIMR disclosure ratings. There were too few DM firms covered by these ratings for meaningful tests. Alternatively, in order to capture differences in management quantitative (point or range) guidance on annual earnings, we further obtained a subsample that is covered by the First Call database. Using this subsample (24,789 observations with 281 DM observations), we compared the number of management guidance announcements pertaining to both current and future year earnings, and pertaining only to future year earnings. The mean differences in both numbers between DM firms and IM firms were not statistically significant (i.e., p-values > 0.10) for all samples. Adding the logged number of management guidance announcements (and interactions with X_{t3}) into the model as additional control variables also does not alter our main results. This suggests that the issuance of management guidance for future earnings is unlikely to explain our results.

In sum, we conclude that improved stock price informativeness via DM disclosure suggests that DM disclosures provide investors with an important useful basis for estimating future earnings and cash flows, incremental to information presented by IM disclosures. This conclusion is invariant with various controls.

Self-Selection Tests

To further address concerns about self-selection bias, in addition to the use of propensity score matched sample in Table 5, we conduct the following three tests.

First, we examine whether our main findings are driven by a possible case where firms with a higher FERC in the pre-SFAS No. 95 period self-select the DM format upon adoption of SFAS No. 95. The pre-SFAS No. 95 fund flow statement prepared under APB Opinion No. 19, *Reporting Changes in Financial Position* (APB 1971), does not specify different forms of statements. Therefore if self-selection concerns are not an issue, we then expect no FERC differences in the pre-adoption period between firms that later self-selected either the DM or IM upon adoption of SFAS No. 95. To implement this test, we code a firm as a DM or IM adopter as of fiscal year 1988 and examine FERC differences in the pre-SFAS No. 95 years 1985–1987. Using a total of 5,903 observations and 342 (278) size (propensity score) matched sample observations in the pre-SFAS No. 95 period that satisfy our data requirements, we estimate Equation (7) with control variables. Table 6, Panel A indicates that coefficients on $DM_t{*}X_{t3}$ are negative and insignificant for the full and matched samples, while other variables have coefficients and significance levels similar to results reported in Table 5, Panel C. Thus, we could not find evidence that DM firms exhibited a higher FERC level before they chose the DM statement upon the adoption of SFAS No. 95. We interpret this finding as alleviating self-selection concerns.

Second, we limit our sample only to firms that issued at least one DM statement of cash flows during the 1989–2002 sample period. From Table 1, Panel A there were 119 firms that issued 604 DM statements in our sample. These same 119 firms issued another 590 IM statements as some of these firms switched either to or from the DM during our

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[32] Similar to our sensitivity checks in the CFO and earnings prediction models, we assess whether our FERC results are driven by a small number of observations with large articulation errors. When we re-estimate Equations (7) and (8) after eliminating observations within the top 10 percent of $abs(Err_t)$, we find that our main results are qualitatively unchanged.

TABLE 6
Self-Selection Issues

Panel A: FERC during a Pre-SFAS No. 95 Period (1985–1987) Partitioned by Initial Adoption of DM or IM with SFAS No. 95

Variable	(1) Full Sample (n = 5,903)	(2) Size Matched Sample (n = 342)	(3) Propensity Score Matched Sample (n = 278)
Intercept	−0.1014	−0.0539	−0.0345
	(.001)	(.001)	(.001)
X_{t-1}	−0.3868	−1.8962	−1.6754
	(.001)	(.001)	(.002)
X_t	0.8333	1.7178	1.6248
	(.001)	(.001)	(.001)
X_{t3}	0.7072	0.5047	0.4806
	(.001)	(.025)	(.019)
R_{t3}	−0.0768	−0.0154	−0.0325
	(.001)	(.641)	(.491)
DM_t^a	0.0223	−0.0569	−0.0325
	(.492)	(.235)	(.505)
$DM_t * X_{t-1}$	−0.6164	1.2745	0.9584
	(.165)	(.216)	(.356)
$DM_t * X_t$	0.6854	0.4319	0.4166
	(.124)	(.756)	(.611)
$DM_t * X_{t3}$	−0.1228	−0.0265	−0.1501
	(.213)	(.664)	(.452)
$DM_t * R_{t3}$	−0.0380	−0.0728	−0.0659
	(.321)	(.149)	(.152)
$SIZE_t$	−0.0172	−0.0191	−0.0104
	(.001)	(.366)	(.128)
$SIZE_t * X_{t3}$	0.0746	0.0562	0.0458
	(.001)	(.196)	(.142)
$LOSS_t$	−0.1559	−0.1593	−0.1206
	(.001)	(.031)	(.021)
$LOSS_t * X_{t3}$	−0.2533	−0.7397	−0.2435
	(.001)	(.001)	(.001)
$GROWTH_t$	0.0001	0.0008	0.0006
	(.001)	(.041)	(.001)
$GROWTH_t * X_{t3}$	0.0002	0.0014	0.0013
	(.034)	(.028)	(.031)
$EARNSTD_t$	0.7854	1.3789	1.4286
	(.001)	(.003)	(.002)
$EARNSTD_t * X_{t3}$	−0.2575	−1.1589	−1.0224
	(.001)	(.021)	(.023)
$NANAL_t$	0.0193	0.0499	0.0527
	(.001)	(.099)	(.187)
$NANAL_t * X_{t3}$	0.0577	0.0424	0.0479
	(.001)	(.582)	(.415)
Adjusted R^2	0.2116	0.3703	0.3575

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TABLE 6 (continued)

Panel B: Analyses with Subsample Issuing at Least One DM Statement Over the Sample Period (n = 1,194)

Variable	Without Control Variables	With Control Variables
Intercept	0.1923 (.001)	−0.0516 (.466)
X_{t-1}	−1.7645 (.023)	−1.4756 (.001)
X_t	1.6982 (.001)	1.4620 (.016)
X_{t3}	−0.0319 (.508)	0.4309 (.001)
R_{t3}	−0.0535 (.007)	−0.0861 (.001)
DM_t^b	−0.0073 (.857)	0.0228 (.553)
$DM_t * X_{t-1}$	0.7808 (.184)	0.6664 (.120)
$DM_t * X_t$	0.7111 (.142)	0.0854 (.799)
$DM_t * X_{t3}$	0.3673 (.003)	0.1919 (.015)
$DM_t * R_{t3}$	−0.0592 (.242)	−0.0419 (.129)
$SIZE_t$		−0.0376 (.026)
$SIZE_t * X_{t3}$		0.0255 (.264)
$LOSS_t$		−0.0950 (.057)
$LOSS_t * X_{t3}$		−0.2640 (.003)
$GROWTH_t$		0.0007 (.001)
$GROWTH_t * X_{t3}$		0.0004 (.003)
$EARNSTD_t$		1.4906 (.001)
$EARNSTD_t * X_{t3}$		−0.6053 (.001)
$NANAL_t$		0.1058 (.001)
$NANAL_t * X_{t3}$		0.1090 (.062)
Adjusted R^2	0.1425	0.2568

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TABLE 6 (continued)

Panel C: Heckman Two-Stage Approach

Variable	**(1) Full Sample (n = 28,947)**	**(2) Size Matched Sample (n = 920)**
Intercept	0.1519 (.001)	−1.5017 (.569)
X_{t-1}	−0.8905 (.001)	−0.8440 (.001)
X_t	0.8916 (.001)	0.9314 (.001)
X_{t3}	0.1754 (.001)	0.4689 (.005)
R_{t3}	−0.0951 (.001)	−0.1133 (.001)
DM_t[b]	−0.4830 (.863)	1.4193 (.154)
$DM_t * X_{t-1}$	−0.5117 (.187)	−0.3615 (.245)
$DM_t * X_t$	0.1383 (.726)	0.1668 (.652)
$DM_t * X_{t3}$	0.2588 (.013)	0.1668 (.018)
$DM_t * R_{t3}$	−0.0179 (.493)	−0.0289 (.307)
$Mills_t$[c]	1.7371 (.204)	1.9477 (.567)
$DM_t * Mills_t$	−0.6072 (.865)	−1.0191 (.156)
$SIZE_t$	−0.0704 (.001)	−0.0643 (.001)
$SIZE_t * X_{t3}$	0.0484 (.001)	0.0579 (.157)
$LOSS_t$	−0.1853 (.001)	−0.0341 (.505)
$LOSS_t * X_{t3}$	−0.4621 (.001)	−0.7863 (.001)
$GROWTH_t$	0.0016 (.001)	0.0009 (.001)
$GROWTH_t * X_{t3}$	0.0003 (.001)	0.0006 (.001)
$EARNSTD_t$	0.9928 (.001)	1.6317 (.001)
$EARNSTD_t * X_{t3}$	−0.1462 (.001)	−0.5268 (.059)
$NANAL_t$	0.0964 (.001)	0.1609 (.001)
$NANAL_t * X_{t3}$	0.0871 (.052)	0.0393 (.582)
Adjusted R^2	0.2320	0.2910

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TABLE 6 (continued)

When estimating the coefficients' standard errors, we use a White (1980) procedure to correct for heteroscedasticity and a clustering procedure that accounts for serial dependence across years for a given firm. Two-tailed p-values are presented in the parentheses.

[a] DM_t = 1 if the firm used direct cash flows method in 1988 upon the adoption of SFAS No. 95, and 0 otherwise.

[b] DM_t = 1 if the direct cash flows method is used for cash flow statements in fiscal year *t*, and 0 otherwise.

[c] $Mills_t$ = the inverse Mills ratio obtained from the first stage probit model in Appendix B.

See Table 2 for the definitions of other variables.

sample period. By limiting the sample only to relatively homogenous firms that issued at least one DM statement during the sample period (n = 1,194), we intend to partially control for self-selection and examine if those firms exhibit a higher FERC when they disclose a DM statement rather than an IM statement. Table 6, Panel B reports results with and without control variables. The results using this subsample are qualitatively similar to those previously reported in Table 5, Panels A and C. That is, we find that even within firms that issued at least a DM statement over our sample period, the amount of future earnings information reflected in current returns is higher only when they issue a DM statement.

Last, we use a Heckman (1979) two-stage approach in which we include the inverse Mills ratio ($Mills_t$) as a control and its interaction with DM_t to allow its coefficient to vary between the DM and IM groups (Ball and Shivakumar 2005; Oswald and Zarowin 2007). We compute the inverse Mills ratio using the probit model in Appendix B for all observations that meet data requirements. Results from estimating the second-stage model on our full sample (n = 28,947) and size matched sample (n = 920) are reported in Table 6, Panel C. The coefficients on the inverse Mills ratios and its interaction with DM are insignificant in both samples, suggesting little impact of self-selection bias on our FERC regressions. More importantly, our primary coefficient of interest ($DM_t{*}X_{t3}$) is positive and significant in both samples. That is, our evidence indicating a higher FERC for firms reporting DM statements does not change with the two-stage approach.

Taken together, we interpret these findings as suggesting that self-selection issues are not likely driving our FERC test results.

VI. SUMMARY AND CONCLUSIONS

In this study we investigate three interrelated research questions designed to explore the predictive value (ability) of direct method (DM) statement of cash flows disclosures. We are motivated to pursue this study by the CFA Institute's recent request for DM disclosure as well as FASB and IASB requests for more research about DM disclosures.

We find extensive articulation errors when using income statement and indirect method (IM) statement of cash flows data to estimate DM line item components. When we include articulation errors from estimates of DM components in CFO and earnings forecasting models, predictions of future CFO and earnings improve. This finding extends prior research forecasting future CFO including Barth et al. (2001) and Cheng and Hollie (2008). As proponents of the DM format claim, our results suggest that while adding individual DM component estimates into prediction models significantly improves forecasts of future cash flow and earnings, such improvement is diminished by the existence of noise in estimates of DM components. To corroborate our CFO and earnings prediction models, we employ a FERC framework and provide evidence that firms producing DM statements have more information about future earnings and cash flows reflected in their current stock returns than firms producing only IM statements. Our CFO and earnings prediction models, corroborated by our FERC framework, match a primary reason that the FASB, IASB, and CFA Institute are interested in DM statements of cash flows: to better predict future firm performance.

Our results taken together offer evidence that firms producing DM statements mitigate articulation errors, enhance forecasts of CFO and earnings, and reflect more future performance in current stock returns. The return results hold across a series of robustness tests including three distinct tests for self-selection. In sum, our results support the CFA Institute's call for DM statements of cash flows.

APPENDIX A
EXAMPLES OF ARTICULATION ERRORS

Exhibit 1 illustrates articulation errors for two large, public U.S. companies. Cash received from customers is estimated first using income statement and balance sheet information and then using income statement and indirect method statement of cash flows information. Both approaches exhibit articulation errors, yet are (were) firms with relatively simple businesses and relatively simple financial statements. Notice particularly that Office Depot aggregates provisions for inventories and receivables into one line item in its cash flows statement, obfuscating a detailed analysis of these different operating activities. IM (DM) refers to Indirect Method (Direct Method). "IM reconciliation" refers to the supplemental IM reconciliation of earnings to cash from operations that is required when firms present DM statements of cash flows.

EXHIBIT 1
Examples of Articulation Errors

Compaq Computer (Selected financial statement information)

Year ended December 31, in millions	1996	
Sales	18,109	
Gross increase in Accounts Receivable per Balance Sheet	154	
Net increase in Accounts Receivable per Balance Sheet	27	
(Increase) in A/R per IM reconciliation	(210)	
Provision for bad debts (from IM reconciliation)	155	
Net income	1,313	
Cash from operations	3,408	
Cash received from customers (from DM statement)	17,939	
Articulation error (based on gross A/R per B/S)		
Sales	18,109	
Less gross increase in A/R per B/S	(154)	
Estimated Cash received from customers	17,955	
Articulation error		16
Articulation error (based on net A/R per B/S)		
Sales	18,109	
Less net increase in A/R per B/S	(27)	
Estimated Cash received from customers	18,082	
Articulation error		143

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EXHIBIT 1 (continued)

Year ended December 31, in millions	**1996**	
Articulation error (based on A/R per IM reconciliation)		
Sales	18,109	
Less increase in A/R per IM reconciliation	(210)	
Estimated Cash received from customers	17,899	
Articulation error		(40)
Articulation error (based on A/R and Provision for bad debts from IM reconciliation)		
Sales	18,109	
Less increase in A/R per IM reconciliation	(210)	
Plus Provision for bad debts (from IM reconciliation)	155	
Estimated Cash received from customers	18,054	
Articulation error		115

Office Depot (Selected financial statement information)

Year ended, in '000s.	**December 25, 1999**	
Sales	$10,263,280	
Gross increase in Receivables per Balance Sheet	129,841	
Net increase in Receivables per Balance Sheet	128,032	
(Increase) in Receivables per IM reconciliation	(152,523)	
Provision for losses on inventories and receivables per IM reconciliation	111,510	
Net income	257,638	
Cash from operations	373,152	
Cash received from customers (from DM statement)	10,205,532	
Articulation error (based on gross A/R per B/S)		
Sales	10,263,280	
Less gross increase in Receivables per B/S	(129,841)	
Estimated Cash received from customers	10,133,439	
Articulation error		(72,093)
Articulation error (based on net A/R per B/S)		
Sales	10,263,280	
Less net increase in Receivables per B/S	(128,032)	
Estimated Cash received from customers	10,135,248	
Articulation error		(70,284)
Articulation error (based on A/R per IM reconciliation)		
Sales	10,263,280	
Less increase in Receivables per IM reconciliation	(152,523)	
Estimated Cash received from customers	10,110,757	
Articulation error		(94,775)
Articulation error (based on A/R and Provision per IM reconciliation)		
Sales	10,263,280	
Less increase in Receivables per IM reconciliation	(152,523)	
Plus Provision for losses on inventories and receivables per IM reconciliation	111,510	
Estimated Cash received from customers	10,222,267	
Articulation error		16,735

APPENDIX B
PROBIT MODEL OF THE DECISION TO REPORT DIRECT METHOD DISCLOSURES

We posit a probit model to assess firms' decisions to disclose direct method (DM) statements of cash flows. Using the results to create a propensity score matched sample (LaLonde 1986) and to build a Heckman (1979) two-stage model, we explore self-selection issues surrounding firms' voluntary choice to disclose DM statements. Propensity score matched sample statistics are shown in Table 2, Panel C and utilized in Table 5 results. Table 6, Panel C documents our Heckman two-stage results.

There is little guidance available from prior studies on firms' decisions to disclose the DM statement. To create a list of potential determinants of DM disclosure we searched annual reports, practitioner-focused news and magazine articles referring to the direct method, CFA Institute material, and held discussions with analysts. We considered both costs and benefits. Costs include: (1) costs to produce the DM statement and (2) proprietary costs of the disclosure. Benefits center on (3) reducing agency costs associated with ownership structure and debt (i.e., DM disclosure is expected to reduce agency costs), (4) raising external capital (i.e., external financing needs are expected to be positively associated with disclosing DM statements), and (5) management signals about efficient operations.

Regarding (1), we expect that more complex firms face higher costs to produce DM statements, and are thus less likely to produce them. This position is supported by a recent survey and a case study by Trout et al. (1993).[33] Our proxies to capture complex transactions and diverse operations are logarithm of total assets (*LOGTA*), logarithm of the number of business and geographic segments (*LOGSEG*), and indicator variables for firms having foreign operations (*FOREIGN*) or recent significant merger/acquisition (*M&A*). We predict negative associations between these variables and disclosure of DM statements.

Voluntarily disclosing DM statements may cause competitive harm (i.e., proprietary costs) because the information can be useful to competitors. For example, when deciding whether to start a price war, competitors may use the information to assess a firm's liquidity or cash generating ability. For this dimension, we include industry adjusted return on assets (*ABNROA*) expecting that a firm's incentive to withhold proprietary information will be greater if the firm is more profitable than rivals in their product markets (Verrecchia and Weber 2006). We also include four-firm concentration ratios (*CR*) expecting that lower concentration reflects higher competition.[34]

DM statements may help reduce a firm's agency costs arising between managers and either owners or loan providers. As agency problems with debt are likely to increase with leverage, DM disclosures are expected to be positively associated with our proxy for leverage (*LEV*) because information furnished by DM statements could enhance monitoring by loan providers (e.g., Leftwich et al. 1981). Regarding agency costs related to ownership structure, we expect that firms with dispersed ownership structures are more likely to use public disclosures to communicate information because firms with concentrated ownership structures can use other information channels such as the board of directors. Thus, we predict a negative association between concentrated ownership (*CONOWN*) and disclosure of DM statements.

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[33] A survey reported in Stuart (2008) states that 4.1 percent of 224 senior financial executives reported that it would be "virtually impossible" to construct an accounting system to prepare a DM statement for their firms, while 18.4 percent said it would be "easy." 11.1 percent were unsure and the remaining survey participants indicated that it would be possible with either major (38.7 percent) or minor (27.6 percent) adjustments. This survey is important because it documents that, depending on underlying operating characteristics, some firms face technical difficulties while trying to produce DM statements.

[34] According to Verrecchia (1983), firms find it costly to make voluntary disclosures because rivals would use the disclosure to obtain a competitive advantage. He conjectures that proprietary costs of disclosure are greater for firms that are more profitable (captured by *ABNROA*) and that operate in more competitive markets (captured by *CR*). The four-firm concentration ratio is often used as a measure of competition in prior studies (e.g., Harris 1998; DeFond and Park 1999; Engel et al. 2003). They expect that prices (unit margins) decline as concentration falls and thus that lower concentration reflects higher competition.

Disclosing DM statements can generate financing benefits in the capital market because it reduces effort needed for cash flow analyses, thereby creating cost savings to investors and financial analysts. Thus, we expect that firms with higher external financing needs are more likely to voluntarily produce a DM statement. We use the net amount of capital a firm raises through debt or equity issuances in current and the following two years (*EXTFIN*) to proxy for the firm's external financing needs.

Pertaining to point (5), because DM statements can be used to assess the quality of management's operating decisions over time, we expect that managers of firms with shorter operating cycles compared to peers in the same industry are more willing to disclose DM statements to signal their managerial effectiveness. We include *ABNOPCYCLE* to proxy for this effect, measured as industry-adjusted sum of days to sell inventory and to collect receivables (i.e., the average time between purchasing inventory and receiving cash proceeds from sales).

We further include four additional control variables in the model. Earnings volatility (*EARNVOL*) and book-to-market ratio (*BTM*) are included because prior research finds that they influence firms' voluntary disclosure decisions (e.g., Chen et al. 2002; Lang and Lundholm 1993; Jones 2007; Tasker 1998).[35] We include a dummy variable indicating high discretionary accruals (*HIDA*) because firms reporting high income-increasing accruals may be reluctant to show details of DM components or, alternatively, they may be more likely to disclose the DM to explain their accruals. Finally, we include year dummies to control for decreasing number of firms reporting a DM statement over our sample period.

Building upon our discussion above, we posit the following probit model (firm subscripts omitted):

$$\begin{aligned} Prob(DM_t = 1) = {} & a_0 + b_1 LOGTA_t + b_2 LOGSEG_t + b_3 FOREIGN_t + b_4 M\&A_t \\ & + b_5 ABNROA_t + b_6 CR_t + b_7 LEV_t + b_8 CONOWN_t \\ & + b_9 EXTFIN_t + b_{10} ABNOPCYCLE_t + b_{11} EARNVOL_t \\ & + b_{12} BTM_t + b_{13} HIDA_t + \text{Year Dummies} + \varepsilon_t. \end{aligned}$$

We considered a number of additional variables that are not included in our final model, but we find that the coefficients on these variables are insignificant and adding those variables does not improve the percentage of correctly classified observations.[36] Further, inclusion or exclusion of these variables has no qualitative effect on our main FERC results.

Briefly, we find that most determinant variables are significant (at less than 5 percent) with expected signs except for *LOGSEG*, *ABNROA*, and *CONOWN*. Overall our probit model reasonably captures observable firms' decisions to report DM statements. The model classifies approximately 78.3 percent of our firm-year observations correctly (see Exhibit 2).

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[35] The book-to-market ratio is often used to capture growth prospects or financial statement informativeness, while earnings volatility is related to analysts' difficulty in predicting future earnings or operational uncertainty.

[36] These include: (1) the age of the firm; (2) restructuring in the prior three years; (3) volatility of cash flow from operations; (4) loss dummies in the current and previous years; (5) Altman's Z-score; (6) sales growth; and (7) industry dummies.

EXHIBIT 2
Probit Model of the Decision to Report Direct Method Disclosures

$$\begin{aligned} \mathit{Prob}(\mathit{DM}_t = 1) = {} & a_0 + b_1\mathit{LOGTA}_t + b_2\mathit{LOGSEG}_t + b_3\mathit{FOREIGN}_t + b_4\mathit{M\&A}_t \\ & + b_5\mathit{ABNROA}_t + b_6\mathit{CR}_t + b_7\mathit{LEV}_t + b_8\mathit{CONOWN}_t \\ & + b_9\mathit{EXTFIN}_t + b_{10}\mathit{ABNOPCYCLE}_t + b_{11}\mathit{EARNVOL}_t \\ & + b_{12}\mathit{BTM}_t + b_{13}\mathit{HIDA}_t + \text{Year Dummies} + \varepsilon_t. \end{aligned}$$

Variable	**Predicted Sign**	**Coefficient**	**Significance ($Pr > \chi^2$)**
Intercept	?	−1.7031	0.0001
LOGTA	−	−0.0896	0.0001
LOGSEG	−	0.0443	0.5210
FOREIGN	−	−0.1397	0.0029
M&A	−	−0.0589	0.0015
ABNROA	−	0.0992	0.6045
CR	+	0.4767	0.0001
LEV	+	0.4009	0.0001
CONOWN	−	0.0528	0.3276
EXTFIN	+	0.0190	0.0429
ABNOPCYCLE	−	−0.0001	0.0015
EARNVOL	?	−1.2401	0.0004
BTM	?	0.0185	0.0423
HIDA	?	0.0667	0.2931
Year dummies	?	Included	—
Percent correctly classified		78.3%	
Log likelihood ratio score ($Pr > \chi^2$)		392.74 (0.0001)	
Number of observations used		28,947	

This exhibit reports coefficient estimates and significance levels from estimating a probit regression modeling the decision to report direct method (DM) cash flow statements. The sample size is reduced to 28,947 (from 39,255) due to additional data requirements. Of the 28,947 firm-year observations, 486 observations report the direct method. Observations with values falling into the top and bottom extreme percentiles of the respective continuous variable are winsorized. Significance levels (p-values) are based on Chi-square tests. "Percent correctly classified" reports the percentage of observations we define as correctly classified; an observation that reports the direct method (indirect method) is correctly classified when the fitted probability is greater than (less than) the ratio of DM observations to IM observations in this sample.

Variable Definitions:
LOGTA = natural log of total assets (in millions) at fiscal year-end;
LOGSEG = natural log of number of business and geographic segments;
FOREIGN = 1 if the firm has foreign operations, and 0 otherwise, as indicated by foreign currency adjustments to income (Compustat #150);
M&A = 1 if the firm experiences a significant merger/acquisition in the current year or previous two years as indicated by Compustat AFTNT1, and 0 otherwise;
ABNROA = industry-adjusted ROA where ROA is defined as income before extraordinary items deflated by average total assets and an industry is defined based on two-digit SIC code;
CR = four-firm concentration ratio based on the sales numbers in two-digit SIC code;

(*continued on next page*)

EXHIBIT 2 (continued)

LEV = leverage defined as long-term debt deflated by total assets;

CONOWN = concentrated ownership defined as 1 minus the relative number of common shareholders to common shares outstanding [= 1 − (the number of common shareholders/the number of common shares outstanding)];

EXTFIN = net amount of capital the firm raises through debt or equity issuances for the current year and the following two years. It is calculated as the three-year sum of net equity financing and net debt financing, from the statements of cash flows, deflated by average total assets;

ABNOPCYCLE = industry-adjusted operating cycle. Operating cycle is defined as the sum of days to sell inventory [=((beginning inventory + ending inventory)/2)/(Cost of goods sold/365)] and days to collect receivables [= ((beginning accounts receivable + ending accounts receivable)/2)/(sales/365)]. An industry is defined based on two-digit SIC code;

EARNVOL = earnings volatility defined as standard deviation of ROA over the four previous years.

BTM = book-to-market ratio at fiscal year-end; and

HIDA = 1 if the firm's signed discretionary accruals (DA) is in the highest quintile during the fiscal year, and 0 otherwise. DA is estimated by modified Jones model for each year and each two-digit SIC code industry.

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Assurance on Sustainability Reports: An International Comparison

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ABSTRACT: Globally, companies increasingly publish separate general purpose, nonfinancial (sustainability) reports. Some of these are independently assured and assurers may or may not be from the auditing profession. We seek to understand this emerging voluntary assurance market. Using a sample of 2,113 companies (from 31 countries) that produced sustainability reports between 2002–2004, we use sequential logit analysis to identify the factors associated with the decision to voluntarily purchase assurance and the choice of assurance provider. We hypothesize that a company's need to enhance credibility through assurance and choice of assurance provider will be a function of company-, industry-, and country-related factors. Our results support the argument that companies seeking to enhance the credibility of their reports and build their corporate reputation are more likely to have their sustainability reports assured, although it does not matter whether the assurance provider comes from the auditing profession. We also find that companies operating in stakeholder-orientated countries are more likely to choose the auditing profession as an assurer.

Keywords: *voluntary assurance; sustainability reports; choice of assurer; assurance services.*

Data Availability: *All data are publicly available.*

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I. INTRODUCTION

The last five years may come to be regarded by social historians as the watershed period in the development of a global consciousness about the reality and effects of climate change. The publication of the *Stern Review* (Stern 2007), the work of the UN Intergovernmental Panel on Climate Change (IPCC 2007), and progress in the development of emissions trading schemes in Europe and elsewhere have all combined to focus community and government attention on the need to pursue a sustainable mode of capitalism. Since the Brundtland Report (1987), the catchcry of "sustainable" business has been associated with many and varied initiatives—from pressure exerted by lobby groups for environmentally friendly disposal of unused assets, to corporations banning the use of child labor in supply chains and the current emphasis on the reduction of carbon emissions.

Within the accounting arena, the sustainability agenda has been linked to early concepts such as social audits and human resource accounting in the 1970s, to intellectual capital, environmental and triple bottom line reporting in the 1990s, and to recent versions of the Global Reporting Initiative (2007). While corporate support for these different accounting /reporting initiatives has varied over time, there has been a consistent concern that traditional financial reports do not adequately represent the multiple dimensions of corporate value today. This has resulted in a search for new financial metrics (see Rappaport 1998; Stewart 1999), and/or additional nonfinancial measures of value/performance (see Kaplan and Norton 1992; Sveiby 1997). Associated with these developments has been a growing tendency for companies to issue general-purpose, stand-alone nonfinancial reports (hereafter, sustainability reports). Some of these reports are independently assured, and the assurer may or may not be a member of the auditing profession. The primary purpose of this study is to better understand this emerging assurance market and, in particular, the role of assurance in establishing corporate credibility. We also seek to inform the international assurance standard-setting process.[1]

The sustainability reports analyzed here are the nonfinancial equivalent to general-purpose financial reports, and are intended to meet the information needs of the general public. Given the primary purpose of this study, there are two major categories of nonfinancial information that are excluded. The first are special purpose reports that are not intended for public consumption, and are therefore of less public interest because they are used primarily for internal decision making or to meet a reporting requirement of a specific regulatory body. The second category of nonfinancial information excluded is nonfinancial information disclosed in annual reports. While companies have been reporting this information in both the annual financial reports to shareholders and in separate voluntary reports (Kolk 2003; Ballou et al. 2006), this study concentrates on the separate (stand-alone) voluntary reports because its main focus is to examine the assurance of this information. The decision to disclose nonfinancial information in an annual report clouds the assurance decision. For the period of analysis, no instance was identified of a separate assurance report for sustainability information contained in an annual report, which could cause confusion as a result of including two assurance reports in the same document.

While there may be certain requirements to disclose nonfinancial information to certain groups (such as specific regulators), around the world, no regulation can be identified that requires this information to be disclosed in the form of a stand-alone report for the general public. As a result, there is no regulation requiring that the information in this report be assured. Thus, this study examines a true voluntary assurance decision.

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[1] One of the authors of this paper is the Chair of the Sustainability Expert Advisory Panel, which is responsible for informing the International Auditing and Assurance Standards Board (IAASB) and helping develop assurance standards or guidance in the area of assurance for sustainability reporting.

A useful way of categorizing the nonfinancial information contained in these sustainability reports is by reference to the six categories of nonfinancial indicators contained in the Global Reporting Initiative (GRI) 2007[2] categorization scheme: economic, environment, labor, human rights, product responsibility, and society. The reports examined for this study range from comprehensively reporting on a single dimension outlined above (such as environmental activities/performance) to reporting on all six dimensions. Variation in the content of the sustainability reports is an issue that may impact on the assurance function, and this study will consider its possible impact. Given that the purchase of assurance is a costly decision, it may be assumed that companies purchase such assurance because the benefits outweigh the costs. Benefits could include increased stakeholder or user confidence in the quality of the sustainability information provided and/or increased stakeholder trust in the level of organizational commitment to sustainability agendas.

In order to better understand this emergent assurance market, we provide background information on the factors associated with the decision to produce sustainability reports. We do not develop and test hypotheses on these factors as the aims of this paper are to analyze and better understand the decision to assure and the choice of assurance provider. In pursuit of these aims, we formally test the factors associated with the organizational decision to assure, and, for those companies that do assure, the factors associated with the choice of assurance provider. We expect that there are company, industry, and country characteristics that will create a greater need to improve the credibility of sustainability information, and therefore influence the decision to assure as well as the choice of assurance provider. The justification for concentrating our formal analysis on those companies that produce sustainability reports is that it is only these organizations that have to decide whether to assure, and only if they decide to assure do they then have to make a decision as to the type of assurance provider.

We argue that assurance is related to a desire to improve the credibility of the disclosed information. In line with the stated aims of the research and extending recent international comparison research (for example, Choi and Wong 2007), we identify characteristics of industries and countries that are expected to result in a greater need for companies to demonstrate that the information they produce is credible.[3] They are therefore more likely to have this information assured and, if so, choose a higher quality assurance provider. For evaluating the role of assurance and choice of assurance provider in the international market, this voluntary setting is therefore more suitable than a regulated financial statement setting.

In brief, our results show the following. For the period 2002–2004, based on 40,993 companies for which we had the required financial data, we found that 2,113 produced sustainability reports for which we were able to gather other required information. Japan (527 companies), the U.K. (385 companies) and the U.S. (339 companies) are the three most heavily represented countries. In total, 655 of these 2,113 (31 percent) public reports are assured, and members of the auditing profession assure 275 (42 percent) of these. Our multivariate results demonstrate a strong link between companies with a higher need to enhance credibility and those having their sustainability reports assured. With regard to the choice of assurance provider, we find that companies domiciled in more stakeholder-orientated countries are more likely to choose a member of the auditing profession. The factors associated with a greater need to add credibility appear to be more closely related to the decision to have the information assured than they are with the choice of assurance provider.

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[2] This is widely regarded as the most dominant set of global reporting regulations for sustainability reporting: "the number of companies around the world adopting GRI standards and issuing corporate sustainability reports, along with the fact that the GRI works closely with the United Nations, gives its reporting criteria the credibility necessary to be considered generally accepted" (Ballou et al. 2006, 66).

[3] The company variables included represent dimensions that have been commonly found to be related to voluntary disclosure and assurance decisions: size, leverage, and profitability (for example, Chow 1982; Hibbit 2003; Cormier et al. 2005). These are therefore included as control variables in the later analyses.

In the next section, we provide a literature review on the demand for voluntary assurance. Subsequently, we develop our hypotheses, followed by a description of our data and empirical models. Finally, we present the results and conclude.

II. LITERATURE REVIEW ON VOLUNTARY ASSURANCE

The companies in this study have voluntarily produced a sustainability report, and have complete discretion as to whether this information is assured. Companies voluntarily produce such reports for a variety of reasons—including informing stakeholders—and thereby reduce the information asymmetry between the company and the market/public. Reporting also attests to organizational commitment, risk management, and a desire to build corporate reputation. In all these cases, the effectiveness of achieving these desired outcomes hinges on the perceived and actual credibility of the information provided. Assurance plays an important role in this. This section examines the findings in the literature on the market demand for assurance, the value obtained by employing assurance, and the incremental value associated with "high-quality" assurance.

Demand for, and Value of, Voluntary Assurance

Only a small number of empirical studies have examined the demand drivers for the voluntary adoption of assurance. Largely this is because the assurance of financial reports has been mandated by law for the better part of the twentieth century in most developed market economies, and research has focused on issues associated with this context. Chow (1982) was one of the first major studies to examine voluntary assurance. He investigated this issue from the agency theory perspective, arguing that agency costs are associated with the voluntary adoption of financial statement audits. His study focused on the year 1926, that is, prior to the introduction in the U.S. of a legal mandate for assurance on historical financial information. He documents that proxies for agency costs associated with both shareholders and creditors, such as leverage, the extent to which accounting numbers are used in debt covenants, and company size are positively associated with the voluntary adoption of financial statement audits.

Abdel-khalik (1993) adopts a different perspective and views the demand for assurance as an effective within-company control mechanism to compensate for the loss of control induced by organizational design and the resultant loss of observability of subordinate behavior. He argues that this loss of internal control may potentially give rise to moral hazard problems and an increasing likelihood of distorted communication. Consistent with the "organizational design" hypothesis, his results indicate that larger companies are more likely to voluntarily demand assurance.

The association between assurance and control is approached from a related but different angle by Blackwell et al. (1998), who argue that the demand for assurance stems from the need to mitigate information asymmetry with institutional creditors. Blackwell et al. (1998) find assurance to be perceived by institutional creditors as an effective means of control. Similarly, Carey et al. (2000) examine family businesses in Australia and find that the voluntary demand for assurance is associated with information asymmetry and loss of control, such that the proportion of non-family managers and non-family directors is positively associated with the demand for external assurance. Consistent with Chow (1982), Carey et al. (2000) find that the demand for assurance is also associated with higher levels of debt.

The above discussion indicates that assurance serves as a useful control mechanism to enhance the credibility of disclosed information and facilitate greater user confidence. Hence, it should result in more appropriate resource allocation decisions by information users.

Demand for "High-Quality" Assurance

In most studies to date, differences in the quality of assurance services provided have been studied by examining differences between the use of Big N firms and non-Big N firms. It is argued that the Big N audit firms possess scale economies and greater capacity to invest in new technologies. They also have a greater investment in maintaining their reputational capital. Taken together these factors suggest that the Big N firms are less likely to behave opportunistically or myopically. As a result, they are better able to serve as an effective monitoring mechanism than are smaller auditors (DeAngelo 1981; Watts and Zimmerman 1986). Moreover, due to their size, the Big N audit firms are less prone to fall victim to fee dependence, as the costs of compromising independence (litigation and reputation costs) outweigh the benefits (Craswell et al. 2002).

Examining the quality issue by comparing differences between the Big N and non-Big N audit firms is sensible within a context in which the law provides monopolistic rights to these firms to conduct the audit of financial statements. Such a state-guaranteed monopoly does not exist in the area of assurance on sustainability reports, and assurance in this unregulated market may also be purchased from other providers such as environmental management firms. It is into markets such as this that visionaries such as Robert Elliott saw the accounting profession expanding its skills as information and assurance (attest) professionals (Elliott and Jacobson 2002). We therefore distinguish between assurance providers who are members of the auditing profession and other assurance providers. Similar to the arguments for the Big N versus non-Big N outlined above, we classify members of the auditing profession as the higher quality assurance providers. The auditing profession has well-developed "global" standards, a body of ethics and independence requirements, as well as quality control mechanisms at both the firm and engagement levels that help ensure that the assurance provided is of a consistently high quality. In areas requiring specific subject matter expertise, which is commonly the case with assurance engagements on sustainability reports, there are specific standards in place to ensure that the engagement is not accepted if the engagement team does not have the required expertise, and procedures to be followed when using the work of experts. It is also a profession with an established history and reputational capital that is well known to communities. These factors help increase public confidence in the competency and legitimacy of the auditing profession as high-quality assurance providers. However, there is usually an increased cost associated with having assurance provided by members of the profession as opposed to other providers,[4] and as such the client chooses which assurance provider to use on a cost versus benefit basis.

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[4] While this is difficult to show systematically as the fees for the engagements are not disclosed, discussions with assurance providers in this area in at least three countries suggest the fees charged by audit firms can be commonly up to five times the fees quoted by environmental consultants for the same engagements.

The Provision and Assurance of Sustainability Reports

Very little is currently known about assurance on sustainability reports, with the exception of some descriptive research surveys that have been undertaken. The most comprehensive of these is KPMG (1999, 2002, 2005), which examines whether the Top 100 companies in a number of different countries produce publicly available sustainability reports, and whether these are assured. A comparison of these three KPMG surveys suggests that the frequency of these types of reports is increasing, at least among the larger companies, and the reports are more commonly assured. Interestingly, there is noticeable between-country variation in both the provision and assurance of sustainability reports. They also indicate that the U.S. was one of a small handful of countries where the number of Top 100 companies issuing sustainability reports decreased between 2002–2005 (32 percent in 2005, down from 36 percent in 2002). In Canada, by contrast, there was a significant increase in the number of Top 100 companies producing such reports (41 percent in 2005 compared with 19 percent in 2002). The KPMG report for 2005 notes that the U.S. and Canada both have an exceptionally low proportion of their sustainability reports assured: U.S.: 3 percent and Canada: 10 percent; relative to U.K.: 53 percent, Australia: 43 percent, continental Europe: 41 percent, and Japan: 31 percent. This low rate in the U.S. may be partly a result of the U.S. attestation standards restricting the auditing profession from providing assurance on these reports (mainly because of concerns about lack of suitable criteria), although this explanation does not account for the inability of other types of assurance providers to fill the void in the U.S. Given that other assurance providers exist, it remains unclear why assurance rates are lower in North America.

The presence of cross-country variation is further supported by a study sponsored by CPA Australia (2004), which identified and categorized 161 assurance reports on general-purpose sustainability reports. That study shows a marked variation over geographic regions with respect to who provides assurance on these reports. In the four major regions classified in the CPA Australia study, audit firms provided assurance on 87 percent of reports in Japan, 60 percent in continental Europe, 23 percent in the U.K., and 15 percent in Australia.

This brief review has highlighted that there is relatively little research on the voluntary purchase of assurance for sustainability reports. Nevertheless, this is an interesting subject matter on which to explore the reasons for the observed patterns in this global assurance market, both with regard to the reasons associated with having this subject matter assured and the choice of assurance provider.

III. DEVELOPMENT OF HYPOTHESES

This study explores why companies producing sustainability reports have this information voluntarily assured and their choice of assurance provider. As independent assurance is a costly process, we expect that the companies that have these reports assured will be those for which the net benefits are greater.[5] As the literature review suggests, assurance confers several benefits. It helps to reduce agency costs[6] and confers greater user confidence in the accuracy and validity of the information provided.

We focus particularly on country-specific and industry factors that influence the benefits companies gain from purchasing assurance. In the international accounting and finance literature, there is growing evidence of the importance of the national legal environment in explaining financial market development, corporate ownership structures, corporate policies, and the properties of accounting information in different countries/jurisdictions (Choi and Wong 2007). In this respect, Francis et al. (2006) provide evidence that governance structures are to some extent endogenous to broader country-level institutions and that company-specific incentives do not entirely explain variation in governance structures.

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[5] As the costs of these assurance services are not disclosed, the analysis concentrates on the characteristics of companies that are expected to gain greater benefit from such services.

[6] Studies (see Chow 1982; Abdel-khalik 1993; Blackwell et al. 1998; Carey et al. 2000) find that higher agency costs reflected by size and leverage are positively associated with the voluntary demand for audit. Hence, we include these factors as control variables in the models that we estimate.

More specifically, we examine whether the organizational benefits resulting from assurance are a function of the legal environment of the country of domicile and the industry to which the company belongs. Why these two variables? Recent literature has shown that companies "adapt to poor legal environments to establish efficient governance practices" (Durnev and Kim 2005) and that "Big Five auditors fulfill a strong governance function in weak legal environments" (Choi and Wong 2007). Extending this argument from the financial audit research, we expect that companies operating in a weaker legal environment will be more likely to purchase assurance to increase user confidence in the credibility of the information contained in their sustainability reports. The demand for assurance is expected to be lower in countries with stronger legal environments because there are more country-level protection mechanisms in place in these environments (Choi and Wong 2007). This is supported by other studies that have found that firm-level governance characteristics are more pronounced in weak legal environments (for example, Klapper and Love 2004; Lang et al. 2004).[7]

Further, prior research has shown that there is an industry association between the level of environmental and social risks experienced by companies and the level of environmental and social disclosure (e.g., Adams et al. 1998; Patten 2002). Hence, we expect that companies belonging to industries having a greater environmental or social impact are more exposed to environmental or social risks and will have a greater need to manage these risks by purchasing assurance to increase user confidence in the credibility of the information contained in the sustainability reports they produce.

In examining choice of assurance provider we draw a distinction between companies that choose assurance from outside the auditing profession (e.g., environmental consultants), and companies that choose assurance from the auditing profession. We classify members of the auditing profession as the high-quality assurance providers (see DeAngelo 1981; Watts and Zimmerman 1986). This classification is supported by the fact that the auditing profession has in place well-developed "global" standards, independence and ethical requirements, and quality control mechanisms to help ensure the quality of any assurance reports that are issued by their members. The argument is further supported by the fact that firms (especially the major firms) within the profession also bring a high level of reputation capital to their engagements. A counter-argument is that specialist providers that are not members of the auditing profession (such as environmental consultancies) may possess a higher level of subject-matter expertise. However, such specialized expertise can always be (and nowadays commonly is) bought or employed by audit firms. Further, price could be an indication of quality in well-informed markets and, as outlined earlier, members of the auditing profession are believed to charge higher prices for the assurance of sustainability reports than assurance providers who are not members of the auditing profession.

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[7] It is recognized that there is the alternative view, that in weak legal environments where the processes in place do not support and discipline auditors, they may be seen to compromise their audit quality, which may decrease the perceived benefits and therefore the demand for this service (Choi and Wong 2007). Consistent with this argument, Francis and Wang (2008) find that Big 4 auditors provide a lower level of audit quality (measured using proxies for earnings quality) in countries with a weaker institutional environment and a lower risk of litigation.

Given the above arguments and the absence of contradictory data, we hypothesize that members of the auditing profession are the higher quality provider.

Formally, our hypotheses are as follows:

H1a: Companies with a greater need to increase user confidence in the credibility of sustainability reports will be more likely to have their sustainability reports assured.

H1b: Companies with a greater need to increase user confidence in the credibility of their sustainability reports will be more likely to choose assurance from the auditing profession.

Aside from the need to increase user confidence, we argue that the business culture of a country, and in particular whether a country is more stakeholder- or shareholder-orientated, can influence the demand for assurance on sustainability reports and the choice of assurance provider. A stakeholder-orientated or communitarian culture is one in which a broad spectrum of stakeholders are seen by society as possessing a legitimate interest in corporate activities. Stakeholder groups in these countries will therefore have considerable influence upon the activities of companies. By contrast, a shareholder-orientated or contractarian business culture is one in which companies are primarily seen as instruments for the creation of shareholder value; other stakeholder groups have less legitimacy and therefore less influence on corporate activities (see Bradley et al. 1999). Given this distinction, we agree with the view that "management in communitarian-orientated societies would be more likely to perform and disclose social responsibility activities as part of strategically managing stakeholder relationships" (Smith et al. 2005). In line with this argument, Holder-Webb et al. (2008) suggest that U.S. companies lag behind international companies with respect to social responsibility reporting as they operate in a cultural environment that has a greater shareholder orientation. By extension, we expect that the demand for assurance and the choice of the auditing profession as assurance provider is higher in stakeholder-orientated countries compared to shareholder-orientated countries. This is reflected in the following two hypotheses:

H2a: Companies domiciled in countries that are more stakeholder-orientated are more likely to demand assurance on sustainability reports compared with companies domiciled in countries that are more shareholder-orientated.

H2b: Companies domiciled in countries that are more stakeholder-orientated are more likely to choose assurance from the auditing profession compared with companies domiciled in countries that are more shareholder-orientated.

IV. DATA

Our research attempted to identify as many sustainability reports as possible that were published covering the period 2002–2004. The major part of the data collection was over 2005 and 2006, and 2004 was the latest complete year of observations at that time. The major source of these reports was Corporate Register (http://www.corporateregister.com), which is a comprehensive directory of published corporate environmental and social reports. This source was supplemented by the Global Reporting Initiative database (http://www.globalreporting.org)[8] and the companies on the Dow Jones Sustainability Index (Dow

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[8] At the time of initial search the GRI maintained its own database. The maintenance of this was later taken over by Corporate Register.

Jones 2007), other databases, and general searches. In total, we identified 2,662 general sustainability reports issued over the period 2002–2004.

In order to obtain the required financial information we used the Global Compustat database that contained 64,256 observations (of which 40,287 had the complete financial information) for the 31 countries identified as having companies producing sustainability reports over the three years. We then attempted to match each of the 2,662 general sustainability reports with a complete observation from Global Compustat, and were able to gain the necessary additional information for 1,407 of the 2,662 observations. For those observations with missing data we then searched the DataStream database and company websites, and were able to obtain the required information for a further 706 company observations, resulting in 40,993 complete company observations for the purposes of providing background information on the reporting decision, and a final sample of 2,113 observations for 867 listed companies over the three years for which we had all the necessary data for testing the hypotheses. Of the 2,113 sustainability reports, 655 (31.00 percent) contained independent assurance reports. We identified that the assurance provider was a member of the auditing profession in 275 (41.98 percent) cases.

V. RESEARCH MODEL

Our hypotheses are tested using a sequential logit model. This model serves the sequential notion of the decisions that are taken as this model is defined as a sequence of independent binary logit models. The sequential logit model estimates the effect of explanatory variables on the probabilities of passing a set of transitions.[9] First, for those companies producing a sustainability report, deciding whether to have this information assured. Second, for those companies deciding to have this information assured, whether to choose an assurance provider from the profession. In addition to these two decisions, there is the prior decision to produce a sustainability report. For completeness sake, these three decisions and the number of observations under each branch are illustrated in the decision tree presented in Figure 1.

The model tested is as follows:

$$\mathit{ASSURANCE/PROVIDER} = f(\mathit{LEGAL},\ \mathit{INDUSTRY},\ \mathit{STAKEHOLDER},\ \mathit{CONTROL\ VARIABLES}). \tag{1}$$

In the first step of the sequential logit analyses, *ASSURANCE* takes the value of 0 in the case of the sustainability report not being assured, and 1 where the report is assured. In the second step, which only includes that subset of observations with assured sustainability reports, *PROVIDER* takes the value of 0 where the assurance provider does not belong to the auditing profession, and 1 in the case of assurance provided by a member of the auditing profession.

LEGAL represents the quality of the legal environment and is measured using the "rule of law" measure developed by the World Bank (Kaufmann et al. 2007).[10] The "Rule of Law" score measures the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence.

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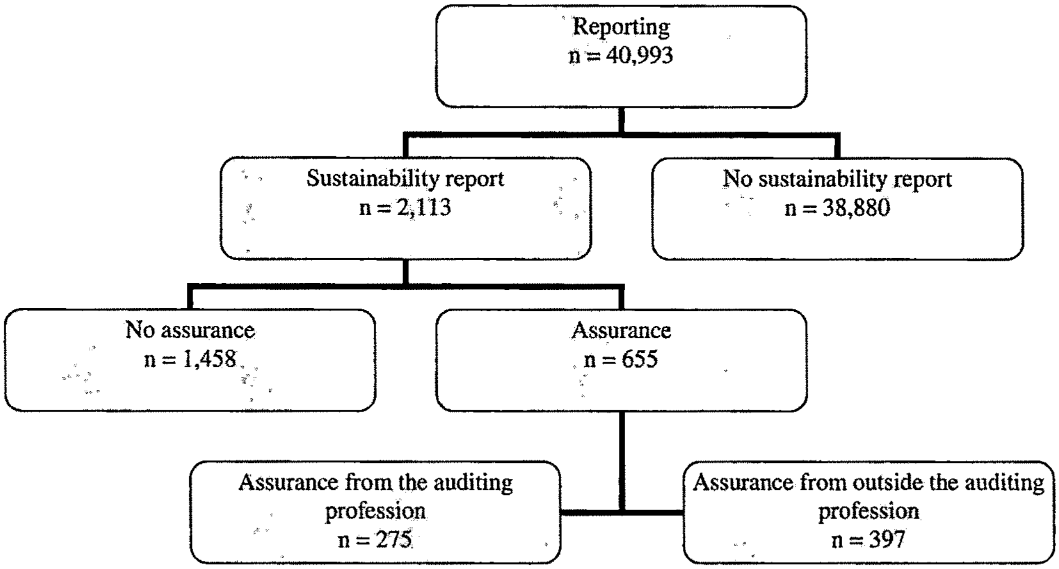
[9] For further technical details, refer to Akiva and Lerman (1985), Liao (1994), and van Ophem and Schram (1997). We estimated the sequential logit model with the "seqlogit" module in STATA. We also re-ran the analyses with separate logistic regression analyses that gave the same results.

[10] We use this measure rather than the La Porta et al. (1998) measures used by Durnev and Kim (2005) and Doidge et al. (2007) as this provides a relevant unique measure for each of the years 2002–2004.

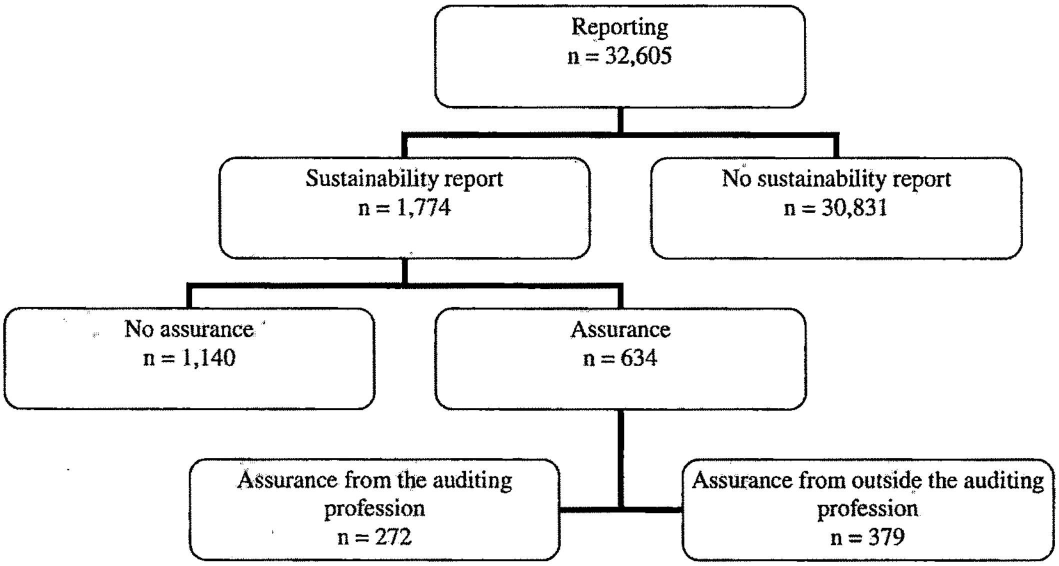
FIGURE 1
Decision Tree

Number of Observations for Sequential Logit Analysis



Seventeen assurance engagements involved assurers from both within and outside the auditing profession.

Sample Excluding the U.S.



The industry categories used are mining, production, utilities, finance, and other, on the basis of a firm's Global Industry Classification Standard (GICS) code and their main reported operating activities. We consider the mining, production, utilities, and finance industries to be more exposed to environmental and social risks and therefore firms in these industries possess a greater need to increase user confidence in the credibility of their reported activities. *MINING* companies extract non-renewable resources with major environmental consequences, while *UTILITIES* produce the largest amounts of greenhouse gas emissions and are exposed to community concerns about climate change. Further, the *PRODUCTION* industry is a major user of energy and can produce significant amounts of industrial waste products. Finally, *FINANCE* industries materially influence the financial well being of societies and have a large "social footprint." As a result, stakeholder groups have a keen interest in the activities of these companies.

Consistent with Ball et al. (2000), we consider companies domiciled in common law countries to have a more shareholder-orientated corporate governance model and those in code law countries to have a more stakeholder-orientated model. Firms in common law countries deal with shareholders at arm's length and as a result an increased demand for information can be expected. In code law countries there is a greater degree of insider owners, such as banks, who get their information directly from management (Ball et al. 2000). Hence, we use a dummy variable for code law/common law as a proxy for *STAKEHOLDER* orientation.

Based on insights from the literature on voluntary demand for assurance, we include the following company-related control variables in our model: size of the company (*Ln(SALES)*), profitability of the company as measured by the return on assets (*ROA*), and leverage of the company as measured by long-term debt on total assets (*LEVERAGE*). The results are run for each separate year and on a pooled basis.[11]

VI. RESULTS

Descriptive Results

As outlined earlier, we identified 2,113 sustainability reports from 31 countries in order to test H1a and H2a. Table 1, Panel A, shows that the three main countries represented are Japan (527 observations), the U.K. (385 observations) and the U.S. (339 observations). In analyzing the contents of the reports, we considered the six dimensions of the GRI framework: economic, environment, labor, human rights, product responsibility, and society. A clear dichotomy was found between reports that covered multiple issues and reports that covered a single issue.[12] As outlined in Table 1, Panel B, 1,612 of the 2,113 reports (76.3 percent) were broad, covering multiple dimensions. The other 501 reports covered a single dimension of the reports and in every one of these instances this was environment. These proportions are consistent with those reported in the KPMG (2005) survey, where 81 percent of the stand-alone sustainability reports covered multiple issues and 19 percent single issues. Because of the concerns of the potential heterogeneity of the sample, particularly on the question of assurance and the choice of assurance provider, the results will be reported both including and excluding the single issue (hereafter, environmental) reports.

Table 1, Panel C, shows that the industries represented are production (1,174 observations), utilities (365 observations), finance (268 observations), mining (119 observations) and other (187 observations). Table 1, Panel D, shows that 707 of these reports relate to year 2004 reports, 719 to 2003 reports, and 687 to reports from 2002. As expected, once

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[11] The pooled analysis is run both with and without year dummies (*YEAR03* and *YEAR04*).

[12] This coding was initially undertaken by a person experienced in reading these reports. An independent second coding of 200 of the year 2004 reports' contents was undertaken by one of the authors, and not one discrepancy from the initial coding was identified.

TABLE 1
Descriptive Statistics for Database Composition and Demographics

Panel A: Frequency of Sustainability Reports and Their Assurance

Country	No Sustainability Report Frequency	Sustainability Report Frequency	Assured Frequency	Not Assured Frequency	Proportion Assured	Stakeholder- or Shareholder-Orientated	Legal Score 2002; 2003; 2004 (Average)
Australia	2,260	90	42	48	46.66%	SHAREHOLDER	1.77; 1.83; 1.82 (1.81)
Austria	175	17	8	9	47.06%	STAKEHOLDER	1.84; 1.81; 1.81 (1.82)
Belgium	275	18	3	15	16.67%	STAKEHOLDER	1.47; 1.51; 1.51 (1.50)
Brazil	370	13	5	8	38.46%	STAKEHOLDER	−0.34; −0.33; −0.33 (−0.33)
Canada	577	116	16	100	13.79%	SHAREHOLDER	1.74; 1.77; 1.8 (1.77)
Denmark	346	21	12	9	57.14%	STAKEHOLDER	1.85; 1.92; 1.97 (1.91)
Finland	285	41	12	29	29.27%	STAKEHOLDER	1.87; 1.90; 1.93 (1.90)
France	1,605	80	32	48	40.00%	STAKEHOLDER	1.28; 1.36; 1.41 (1.35)
Germany	1,603	73	13	60	17.81%	STAKEHOLDER	1.71; 1.71; 1.73 (1.72)
Greece	246	16	1	15	6.25%	STAKEHOLDER	0.69; 0.75; 0.81 (0.75)
Hong Kong	401	15	7	8	46.66%	SHAREHOLDER	1.11; 1.29; 1.37 (1.26)
India	655	8	5	3	62.50%	SHAREHOLDER	−0.02; −0.01; 0.00 (−0.01)
Italy	576	61	39	22	63.93%	STAKEHOLDER	0.77; 0.76; 0.65 (0.73)
Japan	8,743	527	182	345	34.53%	STAKEHOLDER	1.32; 1.32; 1.34 (1.33)
Malaysia	2,130	4	3	1	75.00%	SHAREHOLDER	0.41; 0.44; 0.55 (0.47)
The Netherlands	402	47	17	30	36.17%	STAKEHOLDER	1.75; 1.73; 1.77 (1.75)
New Zealand	173	11	3	8	27.27%	SHAREHOLDER	1.79; 1.86; 1.92 (1.86)

(continued on next page)

TABLE 1 (continued)

Country	No Sustainability Report Frequency	Sustainability Report Frequency	Assured Frequency	Not Assured Frequency	Proportion Assured	Stakeholder- or Shareholder-Orientated	Legal Score 2002; 2003; 2004 (Average)
Norway	356	17	4	13	23.52%	STAKEHOLDER	1.86; 1.91; 1.97 (1.91)
Pakistan	105	1	0	1	0.00%	STAKEHOLDER	−0.76; −0.81; −0.86 (−0.81)
Philippines	301	3	0	3	0.00%	STAKEHOLDER	−0.59; −0.62; −0.65 (−0.62)
Portugal	92	10	1	9	10.00%	STAKEHOLDER	1.22; 1.24; 1.19 (1.22)
Singapore	1,235	3	0	3	0.00%	SHAREHOLDER	1.54; 1.69; 1.82 (1.68)
South Africa	248	54	5	49	9.26%	SHAREHOLDER	0.07; 0.04; 0.15 (0.09)
South Korea	715	15	8	7	53.33%	STAKEHOLDER	0.79; 0.65; 0.7 (0.71)
Spain	299	37	16	21	43.24%	STAKEHOLDER	1.23; 1.29; 1.20 (1.24)
Sweden	713	23	3	20	13.04%	STAKEHOLDER	1.82; 1.88; 1.87 (1.86)
Switzerland	500	60	31	29	51.66%	STAKEHOLDER	1.92; 1.97; 1.98 (1.96)
Taiwan	2,026	2	0	2	0.00%	STAKEHOLDER	0.83; 0.84; 0.81 (0.83)
Thailand	862	6	0	6	0.00%	SHAREHOLDER	0.22; 0.07; 0.05 (0.11)
U.K.	2,557	385	166	219	43.11%	SHAREHOLDER	1.75; 1.75; 1.73 (1.74)
U.S.	8,049	339	21	318	6.19%	SHAREHOLDER	1.57; 1.55; 1.48 (1.53)
Total	38,880	2,113	655	1,458	30.99%		

Panel B: Type of Sustainability Report

Auditor	Frequency	Percentage
Single issue report (Environmental report)	501	23.71%
Multi issue report	1,612	76.29%
Total	2,113	100.00%

(*continued on next page*)

TABLE 1 (continued)

Panel C: Industry

Industry	No Sustainability Report Frequency	Sustainability Report Frequency	Assured Frequency	Not Assured Frequency	Proportion Assured
Production	20,175	1,174	324	850	27.59%
Utilities	3,428	365	133	232	36.43%
Finance	776	268	94	174	35.07%
Mining	1,641	119	53	66	44.53%
Other (services, etc.)	12,860	187	51	136	27.27%
Total	38,880	2,113	655	1,458	30.99%

Panel D: Year

Year	No Sustainability Report Frequency	Sustainability Report Frequency	Assured Frequency	Not Assured Frequency	Proportion Assured
2004	13,056	707	241	466	34.08%
2003	12,599	719	216	503	30.04%
2002	13,225	687	198	489	28.82%
Total	38,880	2,113	655	1,458	30.99%

(*continued on next page*)

TABLE 1 (continued)

Panel E: Details of Assurance Providers

	Frequency[a]	Percentage	No. of Countries Where Firm Assures
Auditing Profession			
Deloitte & Touche	48	17.45%	9
Ernst & Young	63	22.90%	10
KPMG	75	27.27%	11
PWC	94	34.18%	18
Other	1	0.36%	1
Assured sustainability reports involving the auditing profession	275[b]		
Outside Auditing Profession			
Environmental Resources Management (ERM)	31	7.81%	10
URS	23	5.79%	4
SGS	22	5.54%	5
CSR Network	20	5.04%	4
Bureau Veritas	18	4.53%	7
Corporate Citizen Coy	11	2.77%	2
Other	302	76.07%	1
Assured sustainability reports involving assurers outside the auditing profession	397[c]		

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[a] The sum of the two subtotals for this column is 672, however 17 sustainability reports were assured by firms both within and outside the auditing profession. Thus the number of companies whose sustainability reports were assured is 655.

[b] Assurance services were provided by two Big 4 audit firms for six of these 275 sustainability reports, resulting in the frequencies of the individual firm observations totalling 281.

[c] Assurance services were provided by more than one assurer from outside the auditing profession for 30 of these 397 sustainability reports, resulting in the frequencies of the individudal firm observations totalling 427.

a company produces a sustainability report they usually continue to produce this annually. Because of repeat observations over the years, and because in an emerging service the drivers behind this service may be evolving, we report the analysis for each year as well as the pooled analysis for 2002–2004. Of the 867 separate companies producing reports over any of the three years, 552 (63.67 percent) produced reports for all three years of our sample. Furthermore, Table 1, Panel D shows that 655 (31.00 percent) of these sustainability reports (for 304 different companies) contained independent assurance reports,[13] and this subset of firms forms our sample for testing H1b and H2b.

For 275 (41.98 percent) of these 655 cases, the assurance provider was a member of the auditing profession.[14] Table 1, Panel E shows that, with one exception, all assurance by the auditing profession was provided by the Big 4, with the major assurance provider being PricewaterhouseCoopers, accounting for 34.18 percent of assurance provided by the auditing profession. The assurers from outside the profession were comprised of a number of global networks (six were identified that provided assurance in more than one country, providing in total 31.49 percent of the assurance from outside the profession), and a large number of local assurers with varying qualifications. Of the 146 companies that had their sustainability reports assured for the three years, 54 were assured by the auditing profession, of which 50 (92.59 percent) kept the same assurance provider over the three years. Of the remaining 92 companies that were assured by the non-auditing profession, 55 (59.78 percent) kept the same assurance provider over the three years.

Of the 655 companies that had their sustainability report assured, 497 had their financial statements audited by a Big 4 audit firm. Of these 497 companies, 198 (39.84 percent) also selected a Big 4 audit firm as the assurer of the sustainability report. Of the 158 companies whose financial statements were audited by other than a Big 4 audit firm, 78 (49.37 percent) selected a Big 4 audit firm as the assurer of their sustainability report. This suggests that there is little successful cross-selling of this assurance service. Of the 198 organizations that continued to use a Big 4 firm as the assurer of their sustainability report, 129 (65.15 percent) chose the same Big 4 firm that audited their financial statements.

The descriptive statistics are shown in Table 2. Our sample of companies producing sustainability reports is significantly larger, with a mean sales value of U.S.$15,042 million for those that do compared with U.S.$1,107 million for those that do not ($t = 77.77$, $p < 0.001$). They are also more profitable, with a return on assets of 3.2 percent compared with −2.3 percent ($t = 11.01$, $p < 0.001$), and their level of long-term debt to total assets is higher at 19.2 percent compared with 13.1 percent ($t = 17.14$, $p < 0.001$). With regard to the variables of interest for our hypotheses, their average *LEGAL* score is higher at 1.47 compared with 1.31 ($t = 13.92$, $p < 0.001$), suggesting that companies in stronger legal environments are more likely to produce these reports. With respect to *STAKEHOLDER*, 56.1 percent of the sample without sustainability reports and 51.6 percent of those producing sustainability reports come from code law countries and are therefore considered to be stakeholder-orientated (Ball et al. 2000), showing that a higher proportion of shareholder-orientated companies are likely to produce sustainability reports. The correlation matrix is shown in Table 3 for both the entire sample and the sample with sustainability reports. Except for the expected negative correlations between the major industry classifications, there is no absolute correlation above 0.4.

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[13] The proportion of sustainability reports containing an independent assurance report is consistent with the 30 percent identified by KPMG (2005).

[14] This is a lower proportion than that reported by KPMG (2005), which identified that 58 percent of assurance observations were provided by major accountancy firms. These differences are most likely due to differences in sample composition, with KPMG's sample comprising the top 100 companies from 16 countries.

TABLE 2
Descriptive Statistics for Model Variables

Entire Sample

	Year 2002 (n = 13,912)			Year 2003 (n = 13,318)			Year 2004 (n = 13,763)			Years 2002–2004 (n = 40,993)		
	Mean	**Median**	**Std. Dev.**	**Mean**	**Median**	**Std. Dev.**	**Mean**	**Median**	**Std. Dev.**	**Mean**	**Median**	**Std. Dev.**
SALES	1598.42	167.31	7534.74	1881.57	200.54	8700.10	1999.64	203.89	9442.95	1825.12	189.55	8591.91
LEVERAGE	0.137	0.082	0.161	0.136	0.084	0.159	0.129	0.077	0.155	0.134	0.081	0.158
ROA	−0.043	0.018	0.261	−0.017	0.024	0.216	0.0004	0.032	0.195	−0.020	0.025	0.227
LEGAL	1.310	1.540	0.515	1.328	1.550	0.534	1.317	1.41	0.525	1.318	1.480	0.525
STAKEHOLDER	0.561	1	0.496	0.551	1	0.497	0.563	1	0.495	0.559	1	0.496

Sample without Sustainability Reports

	Year 2002 (n = 13,225)			Year 2003 (n = 12,599)			Year 2004 (n = 13,056)			Years 2002–2004 (n = 38,880)		
	Mean	**Median**	**Std. Dev.**	**Mean**	**Median**	**Std. Dev.**	**Mean**	**Median**	**Std. Dev.**	**Mean**	**Median**	**Std. Dev.**
SALES	1002.93	147.19	4715.21	1125.73	176.87	5104.84	1193.85	178.74	5564.73	1106.83	166.77	5139.13
LEVERAGE	0.134	0.076	0.161	0.133	0.078	0.159	0.127	0.072	0.155	0.131	0.075	0.158
ROA	−0.047	0.017	0.266	−0.020	0.024	0.222	−0.001	0.031	0.199	−0.023	0.024	0.232
LEGAL	1.301	1.47	0.519	1.319	1.55	0.539	1.309	1.41	0.529	1.310	1.470	0.529
STAKEHOLDER	0.564	1	0.495	0.554	1	0.497	0.565	1	0.495	0.561	1	0.496

(*continued on next page*)

TABLE 2 (continued)

Sample with Sustainability Reports

	Year 2002 (n = 687)			Year 2003 (n = 719)			Year 2004 (n = 707)			Years 2002–2004 (n = 2,113)		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
SALES	13061.72	5098.87	24170.84	15126.22	5930.35	27585.41	16879.88	6985.28	30525.65	15041.76	5934.11	27610.8
LEVERAGE	0.196	0.176	0.149	0.195	0.177	0.148	0.183	0.170	0.138	0.192	0.174	0.145
ROA	0.015	0.020	0.108	0.035	0.028	0.061	0.045	0.038	0.058	0.032	0.029	0.079
LEGAL	1.477	1.57	0.405	1.477	1.55	0.414	1.464	1.48	0.418	1.473	1.550	0.412
STAKEHOLDER	0.509	1	0.500	0.513	1	0.500	0.526	1	0.499	0.516	1	0.499

Variable Definitions:

SALES = sales in millions U.S.$;

LEVERAGE = long-term debt/total assets;

ROA = return on assets, net profit (loss)/total assets;

LEGAL = legal environment; rule of law score developed by the World Bank (Kaufmann 2006); the "Rule of Law" score measures the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence; and

STAKEHOLDER = dummy variable where company domiciled in code law country equals 1.

TABLE 3
Correlation Matrix

Entire Sample (n = 40,993)

	Ln(Sales)	*LEVERAGE*	*ROA*	*MINING*	*PRODUCTION*	*UTILITIES*	*FINANCE*	*OTHER*	*STAKEHOLDER*	*LEGAL*
Ln(Sales)	1									
LEVERAGE	0.234	1								
ROA	0.349	−0.033	1							
MINING	−0.237	−0.024	−0.082	1						
PRODUCTION	0.055	−0.070	0.062	−0.220	1					
UTILITIES	0.129	0.233	0.018	−0.067	−0.332	1				
FINANCE	0.003	0.037	0.009	−0.034	−0.167	−0.051	1			
OTHER	−0.029	−0.072	−0.047	−0.141	−0.699	−0.214	−0.108	1		
STAKEHOLDER	0.051	−0.115	0.108	−0.175	0.110	−0.034	−0.051	0.005	1	
LEGAL	0.039	0.044	−0.125	0.104	−0.127	−0.019	0.014	0.104	−0.143	1

Sample with Sustainability Reports (n = 2,113)

	Ln(Sales)	*LEVERAGE*	*ROA*	*MINING*	*PRODUCTION*	*UTILITIES*	*FINANCE*	*OTHER*	*STAKEHOLDER*	*LEGAL*
Ln(Sales)	1									
LEVERAGE	−0.012	1								
ROA	−0.026	−0.132	1							
MINING	−0.140	0.016	0.075	1						
PRODUCTION	0.007	−0.184	0.100	−0.269	1					
UTILITIES	0.004	0.364	−0.118	−0.110	−0.510	1				
FINANCE	0.022	−0.191	−0.089	−0.091	−0.420	−0.174	1			
OTHER	0.070	0.047	0.032	−0.075	−0.348	−0.142	−0.118	1		
STAKEHOLDER	0.113	−0.114	−0.057	−0.161	0.220	−0.021	−0.149	−0.051	1	
LEGAL	0.064	0.050	−0.012	0.042	−0.019	−0.010	−0.013	0.030	−0.226	1

Variable Definitions:

MINING = dummy variable equal to 1 if company is in mining industry;
PRODUCTION = dummy variable equal to 1 if company is in production industry;
UTILITIES = dummy variable equal to 1 if company is in utilities industry;
FINANCE = dummy variable equal to 1 if company is in finance industry; and
OTHER = company is in other than the mining, production, utilities, or finance industries.

Multivariate Results

As we outlined earlier, because the emphasis in this paper is on the assurance decision, we include an analysis of the factors associated with the decision to produce sustainability reports as background information only. A significant prior literature (see for example Berthelot et al. 2003; Cormier and Magnan 1999) already focuses on understanding the incentives to produce sustainability or environmental reports and we do not seek to replicate that research here. This background information on the decision to produce sustainability reports is obtained by using sequential logit with the decision to report as the first stage of that analysis. The statistical model (Equation (1) above) is run with those companies who do not produce a sustainability report taking a value of 0, and those reporting taking a value of 1.

Further, as outlined earlier, because of concerns about the potential heterogeneity of the reporting entities, we distinguished between those that produced an environmental (single issue) report, and those that produced a sustainability report covering multiple dimensions. For this reason, the results for the decision to assure and the choice of assurance provider are reported separately for all companies producing sustainability reports, and only companies producing multiple issue sustainability reports. The discussion of the multivariate results using sequential logit analysis[15] will cover all observations in the first place, and then an analysis of the results which excludes those companies producing single issue environmental reports. It will also include an initial discussion of the results pooled for 2002–2004, followed by a discussion of the differences in the results for the single years.

Background Information on the Decision to Produce Sustainability Reports

We find that large companies ($t = 54.72$, $p < 0.001$, two-tailed) and more highly leveraged companies ($t = 2.28$, $p < 0.05$, two-tailed) are more likely to produce stand-alone sustainability reports (see Table 4, Part 1). With regard to the industry characteristics we find that companies in the mining ($t = 16.59$, $p < 0.001$, two-tailed), production ($t = 17.19$, $p < 0.001$, two-tailed), utilities ($t = 13.51$, $p < 0.001$, two-tailed), and finance ($t = 24.45$, $p < 0.001$, two-tailed) industries are more likely to produce sustainability reports than companies in the other industries. In relation to country-specific variables, companies residing in stakeholder countries ($t = 3.57$, $p < 0.001$, two-tailed) and countries with stronger legal environments ($t = 6.64$, $p < 0.001$, two-tailed) are more likely to produce sustainability reports.

Decision to Voluntarily Purchase Assurance

For those companies that produced sustainability reports, the results of the sequential logit analysis of the factors associated with the decision as to whether to have these reports assured is outlined in Table 4, Part 2. In examining the control variables, we find that large companies (*Ln(SALES)*) are significantly more likely to have their sustainability reports assured compared to small companies ($t = 3.81$, $p < 0.001$, two-tailed), while financial risk (*LEVERAGE*) was not associated with this decision ($t = 1.22$, $p > 0.1$, two-tailed). Profitability (*ROA*) was significant in 2004, causing this variable to be marginally significant for the pooled analysis examining all sustainability reports ($t = 1.71$, $p < 0.1$, two-tailed), but was not significant for any of the periods when environmental reports were excluded.

With respect to our hypotheses we find strong support for H1a, which states that companies with a higher need to enhance credibility will be more likely to have their sustainability reports assured. In particular, we find that companies in three of our four categories

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[15] We also run the analyses with separate logistic regression analyses, with the same results.

TABLE 4
Results from Each Part of the Sequential Logit Model

	Sample Including Environmental Reports				Sample Excluding Environmental Reports			
Part 1: Reporting	**2002 n = 13,912**	**2003 n = 13,318**	**2004 n = 13,763**	**2002–2004 n = 40,993**	**2002**	**2003**	**2004**	**2002–2004**
Constant	−11.950 (−29.68)***	−12.393 (−31.30)***	−12.708 (−32.40)***	−12.284 (−53.99)***				
Ln(SALES)	0.971 (30.75)***	1.015 (31.85)***	1.036 (32.09)***	1.004 (54.72)***				
LEVERAGE	0.143 (0.46)	0.502 (1.52)	0.712 (2.09)**	0.430 (2.28)**				
ROA	0.052 (0.13)	1.510 (2.11)**	1.675 (2.16)**	0.613 (1.61)				
MINING	2.865 (10.89)***	2.631 (9.79)***	2.214 (8.02)***	2.573 (16.59)***				
PRODUCTION	1.555 (9.77)***	1.620 (10.28)***	1.461 (9.68)***	1.543 (17.19)***				
UTILITIES	1.596 (8.44)***	1.463 (7.83)***	1.296 (7.08)***	1.449 (13.51)***				
FINANCE	3.658 (14.98)***	3.442 (13.81)***	3.338 (13.62)***	3.476 (24.45)***				
STAKEHOLDER	0.236 (2.27)**	0.186 (1.80)*	0.242 (2.37)**	0.211 (3.57)***				
LEGAL	0.563 (3.57)***	0.546 (3.76)***	0.602 (4.19)***	0.569 (6.64)***				

(*continued on next page*)

TABLE 4 (continued)

Part 2: Assurance	Sample Including Environmental Reports				Sample Excluding Environmental Reports			
	2002 n = 687	2003 n = 719	2004 n = 707	2002–2004 n = 2,113	2002 n = 488	2003 n = 538	2004 n = 586	2002–2004 n = 1,612
Constant	−3.071	−3.591	−2.517	−2.995	−2.902	−3.095	−2.596	−2.825
	(−4.38)***	(−4.70)***	(−3.39)***	(−7.16)***	(−3.73)***	(−3.82)***	(−3.20)***	(−6.25)***
Ln(SALES)	0.079	0.162	0.139	0.129	−0.004	0.126	0.134	0.096
	(1.38)	(2.66)***	(2.33)**	(3.81)***	(−0.07)	(1.78)*	(2.02)**	(2.51)**
LEVERAGE	0.447	0.793	0.212	0.479	0.312	0.420	0.295	0.324
	(0.66)	(1.23)	(0.30)	(1.22)	(0.40)	(0.58)	(0.39)	(0.73)
ROA	1.187	0.060	3.541	1.594	1.563	−0.901	2.591	1.215
	(1.15)	(0.03)	(2.15)**	(1.71)*	(1.25)	(−0.61)	(1.61)	(1.36)
MINING	1.275	1.198	0.948	1.151	1.555	1.121	1.101	1.236
	(2.83)***	(2.67)***	(2.12)**	(4.47)***	(3.06)***	(2.42)**	(2.34)**	(4.56)***
PRODUCTION	−0.081	0.143	−0.078	0.000	0.311	0.104	0.058	0.145
	(−0.25)	(0.45)	(−0.27)	(0.00)	(0.77)	(0.31)	(0.19)	(0.75)
UTILITIES	0.348	0.559	0.470	0.465	0.939	0.685	0.769	0.775
	(0.95)	(1.57)	(1.43)	(2.32)**	(2.11)**	(1.81)*	(2.17)**	(3.50***
FINANCE	0.633	0.725	0.460	0.592	0.869	0.536	0.504	0.589
	(1.63)	(1.83)*	(1.20)	(2.64)***	(1.91)*	(1.29)	(1.25)	(2.45)**
STAKEHOLDER	0.607	0.657	0.700	0.639	0.742	0.903	1.042	0.902
	(3.18)***	(3.59)***	(3.93)***	(6.03)***	(3.34)***	(4.51)***	(5.50)***	(7.77)***
LEGAL	0.577	0.320	−0.072	0.237	0.691	0.267	−0.079	0.238
	(2.36)**	(1.36)	(−0.34)	(1.84)*	(2.62)***	(1.11)	(−0.35)	(1.78)*

(*continued on next page*)

TABLE 4 (continued)

Part 3: Assurance Provider	Sample Including Environmental Reports				Sample Excluding Environmental Reports			
	n = 198	n = 216	n = 241	n = 655	n = 143	n = 167	n = 217	n = 527
Constant	−2.755	−0.775	−1.94	−1.774	−4.273	−1.192	−1.878	−2.092
	(−1.91)*	(−0.59)	(−1.51)	(−2.35)**	(−2.33)**	(−0.85)	(−1.40)	(−2.55)**
Ln(SALES)	0.150	0.086	0.254	0.170	0.214	0.154	0.225	0.200
	(1.43)	(0.83)	(2.43)**	(2.90)***	(1.58)	(1.31)	(2.02)**	(2.97)***
LEVERAGE	−1.360	−3.537	−1.191	−1.953	−1.812	−3.579	−1.316	−2.166
	(−1.12)	(−2.72)***	(−1.00)	(−2.90)***	(−1.06)	(−2.33)**	(−1.05)	(−2.73)***
ROA	1.355	−3.386	−4.088	−1.754	2.148	−4.069	−3.377	−2.211
	(0.47)	(−1.71)*	(−1.27)	(−1.39)	(0.50)	(−1.85)*	(−0.98)	(−1.51)
MINING	1.225	0.454	0.492	0.642	2.108	0.740	0.640	0.915
	(1.46)	(0.55)	(0.67)	(1.41)	(1.78)*	(0.86)	(0.86)	(1.88)*
PRODUCTION	0.131	0.337	−0.461	−0.040	1.056	0.592	−0.278	0.258
	(0.22)	(0.58)	(−0.90)	(−0.12)	(1.08)	(0.94)	(−0.53)	(0.70)
UTILITIES	0.617	1.108	−0.168	0.461	1.458	1.268	−0.074	0.646
	(0.90)	(1.56)	(−0.28)	(1.22)	(1.25)	(1.60)	(−0.12)	(1.50)
FINANCE	0.595	0.232	−0.006	0.233	1.424	0.409	0.187	0.459
	(0.86)	(0.34)	(−0.01)	(0.62)	(1.33)	(0.56)	(0.31)	(1.11)
STAKEHOLDER	1.856	1.238	1.135	1.319	1.907	1.116	1.175	1.272
	(4.05)***	(3.36)***	(3.16)***	(6.03)***	(3.41)***	(2.79)***	(3.11)***	(5.38)***
LEGAL	−0.185	−0.501	−0.477	−0.421	−0.047	−0.689	−0.478	−0.479
	(−0.36)	(−1.13)	(−1.21)	(−1.65)*	(−0.08)	(−1.48)	(−1.21)	(−1.79)*
Log pseudolikelihood	−2136.58	−2175.48	−2186.14	−6522.50	−1620.71	−1718.87	−1868.61	−5233.79
(Wald chi-squared)	(1196.00)***	(1252.07)***	(1262.00)***	(3705.62)***	(989.40)***	(1049.75)***	(1114.93)***	(3142.50)***

*, **, *** Significantly different from zero at the α = 0.10, 0.05, and 0.01 levels, respectively, for two-tailed tests.

of industries that are expected to require enhanced credibility of published reports: *MINING* ($t = 4.47$, $p < 0.001$, two-tailed), *UTILITIES* ($t = 2.32$, $p < 0.05$, two-tailed) and *FINANCE* ($t = 2.64$, $p < 0.01$, two-tailed), but not *PRODUCTION* ($t = 0.00$, $p > 0.10$, two-tailed), are more likely to have their sustainability reports assured.

With regard to H2a, we find that *STAKEHOLDER* is significant ($t = 6.03$, $p < 0.001$, two-tailed), indicating that those companies in stakeholder countries are more likely to have their sustainability reports assured. However, this finding must be considered in light of the additional analysis reported later in this paper, which shows that this result is primarily attributable to a U.S. effect. *LEGAL* is *positively* significant ($t = 1.84$, $p < 0.1$, two-tailed), suggesting that those in the stronger legal system are more likely to be assured. Opposite to what was expected on the basis of findings for the quality of financial report assurance (Choi and Wong 2007), it appears that in weaker legal environments, assurance is not used to increase user confidence in the credibility of sustainability reports. As outlined earlier, a potential alternative explanation is that the public's perceived credibility of this type of assurance service is low in countries with a weak legal environment, and therefore the benefits of assurance for companies do not outweigh the costs. Of relevance here is the decrease in this variable's significance over the period 2002–2004, suggesting that while this may have been an appropriate alternative explanation in 2002, it does not appear to be the situation in 2004. A similar result is found when environmental reports are excluded from the analysis.[16]

Choice of Assurance Provider

The results of the sequential logit analysis for choice of assurance provider for those companies that have their sustainability reports assured is contained in Part 3 of Table 4. In analyzing the control variables we find a significant positive association between the size of the company and the choice of a member of the auditing profession as assurance provider ($t = 2.90$, $p < 0.01$, two-tailed), while there is no significant association between profitability of a company in the form of return on assets and assurance provider ($t = -1.39$, $p > 0.1$, two-tailed). Members of the auditing profession are also found to be more likely to be the assurance provider for companies with lower leverage ($t = -2.90$, $p < 0.01$, two-tailed). It is possible that this is a result of the auditing profession being less likely to associate with companies with higher levels of financial risk.

The results show little support for H1b, i.e., that those companies with a higher need to enhance credibility are more likely to choose assurance from the auditing profession. In particular, legal environment (*LEGAL*) is marginally significant ($t = -1.65$, $p < 0.10$, two-tailed), while companies in the mining, production, utilities, and finance industries are no more likely to choose a member of the auditing profession as their assurance provider than other companies. The lack of significant results holds across all years, both including and excluding environmental reports.[17]

The results provide strong support for H2b, that companies domiciled in countries that are more stakeholder-orientated are more likely ($t = 6.03$, $p < 0.01$, two-tailed) to choose assurance from the auditing profession compared with companies domiciled in countries that are more shareholder-orientated. As distinct from the analysis of the assurance decision, this finding holds when the U.S. observations are excluded, as reported in the following additional analysis.

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[16] For the decision to voluntarily purchase assurance, similar results are found for the pooled analysis when dummy variables are included for 2003 and 2004. The 2004 dummy variable is marginally significant ($t = 1.79$, $p < 0.10$, two-tailed), suggesting 2004 sustainability reports are more likely to be assured than 2002 reports, consistent with the descriptive statistics reported in Table 1.

[17] *MINING* was marginally significant for the pooled analysis excluding environmental reports ($t = 1.88$, $p < 0.10$, two-tailed).

VII. SENSITIVITY ANALYSIS

While it is necessary to include all countries in order to properly analyze and gain an understanding of this international assurance service, it is possible that certain countries may be influencing the results. In analyzing assurance services by the countries that constitute a significant proportion of our observations, we identify that assurance of sustainability reports is far lower in the U.S. than in other major countries. This may be due to the country's attestation standards existing at the time, concerns over whether suitable criteria exist for such engagements and/or fear of litigation (Ballou et al. 2006).[18] With the U.S. also rating as strongly shareholder-orientated, we indeed find the results for the variable "stakeholder" in the assurance decision to be different depending on whether observations from the U.S. are included. The exclusion does not affect the interpretation of any other results, as outlined in Table 5.

The results when including the U.S. observations show that companies in stakeholder countries are more likely to have their sustainability reports assured. This finding is entirely attributable to the U.S., as after excluding U.S. observations we find that there are no longer significant results for *STAKEHOLDER* with regard the decision to assure, across all years and both including and excluding environmental reports. However (and irrespective of whether the U.S. observations are included or excluded), once a decision to assure has been made, companies in *STAKEHOLDER* countries are more likely to choose a member of the auditing profession as their assurance provider.

We also observe that a large number of observations come from two other countries, Japan (527 (24.94 percent)) and the U.K. (385 (18.22 percent)). Including dummies for U.K. and Japan does not change the results, with the exception that, for the decision to assure, the legal variable is no longer significant, while at the same time the U.K. dummy is significantly positive. The correlation between *LEGAL* and U.K. is 0.3091, suggesting that what we see as a legal effect on the decision to assure is primarily due to observations from the U.K.

VIII. CONCLUSION

This paper aims to develop an understanding of the international market for assurance services provided on general-purpose, stand-alone sustainability reports and the factors associated with the demand for such assurance and the choice of assurance provider. We use sequential logit analysis to: (1) provide background information on the factors associated with the decision to produce these comprehensive reports; (2) for those that do produce, the factors associated with having such information assured; and (3) for those that do have this information assured, the factors associated with the choice of assurance provider. In particular, by providing insights into the market for assurance of sustainability reports and the market share captured by members of the auditing profession, we aim to inform the international assurance standard setting process in this new and growing field.

The results of this study generally support our empirical predictions that the incidence of assurance of sustainability reports is higher for companies with a greater need to enhance

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[18] The American Institute of Certified Practicing Accountants (AICPA) standards on attest engagements (AT Section 101) allow such assurance engagements in certain circumstances including that the practitioner must have adequate technical training and proficiency, knowledge of the subject matter and reason to believe that the subject matter is capable of evaluation against criteria that are suitable and available to the user. This is consistent with the requirements of the International Standard on Assurance Engagements (ISAE) 3000.

TABLE 5
Results from the Sequential Logit Model for Sample without the U.S.

	Sample Including Environmental Reports				Sample Excluding Environmental Reports			
Reporting	2002 n = 10,991	2003 n = 10,521	2004 n = 11,093	2002–2004 n = 32,605	2002	2003	2004	2002–2004
Constant	−11.676 (−29.53)***	−12.182 (−30.64)***	−12.164 (−31.51)***	−11.918 (−53.11)***				
Ln(SALES)	1.053 (28.74)***	1.104 (29.75)***	1.091 (30.19)***	1.078 (51.22)***				
LEVERAGE	0.719 (1.92)*	1.259 (3.12)***	1.382 (3.35)***	1.099 (4.82)***				
ROA	0.217 (0.42)	2.297 (2.66)***	1.479 (1.61)	0.799 (1.75)*				
MINING	2.728 (8.81)***	2.470 (7.68)***	2.104 (6.51)***	2.433 (13.29)***				
PRODUCTION	1.583 (8.95)***	1.641 (9.31)***	1.533 (8.91)***	1.584 (15.72)***				
UTILITIES	1.602 (7.48)***	1.431 (6.85)***	1.273 (6.07)***	1.435 (11.83)***				
FINANCE	4.044 (15.14)***	3.740 (13.25)***	3.548 (12.98)***	3.773 (23.83)***				
STAKEHOLDER	−0.892 (−7.47)***	−0.961 (−7.96)***	−0.810 (−6.64)***	−0.898 (−12.94)***				
LEGAL	0.623 (4.93)***	0.584 (5.04)***	0.539 (4.75)***	0.570 (8.38)***				

(continued on next page)

TABLE 5 (continued)

	Sample Including Environmental Reports				Sample Excluding Environmental Reports			
Assurance	**2002** **n = 575**	**2003** **n = 605**	**2004** **n = 594**	**2002–2004** **n = 1,774**	**2002** **n = 383**	**2003** **n = 431**	**2004** **n = 478**	**2002–2004** **n = 1,292**
Constant	−3.139 (−4.39)***	−3.769 (−4.78)***	−2.959 (−3.80)***	−3.236 (−7.49)***	−3.090 (−3.74)***	−3.464 (−4.05)***	−3.125 (−3.69)***	−3.223 (−6.75)***
Ln(SALES)	0.175 (2.77)***	0.253 (3.74)***	0.262 (3.79)***	0.231 (6.07)***	0.116 (1.56)*	0.243 (3.01)***	0.280 (3.52)***	0.223 (5.02)***
LEVERAGE	0.457 (0.65)	0.894 (1.32)	0.200 (0.27)	0.524 (1.27)	0.502 (0.61)	0.785 (1.03)	0.321 (0.40)	0.548 (1.18)
ROA	0.990 (1.11)	0.131 (0.07)	3.185 (1.85)*	1.331 (1.56)	1.096 (1.16)	−1.160 (−0.74)	1.870 (1.14)	0.761 (1.03)
MINING	1.174 (2.45)**	1.032 (2.17)**	0.899 (1.91)*	1.066 (3.90)***	1.417 (2.61)***	0.940 (1.91)*	1.007 (2.08)**	1.126 (3.92)***
PRODUCTION	−0.012 (−0.03)	0.265 (0.75)	0.284 (0.86)	0.199 (1.00)	0.388 (0.88)	0.246 (0.68)	0.415 (1.24)	0.364 (1.70)*
UTILITIES	0.461 (1.17)	0.673 (1.77)*	0.759 (2.10)**	0.651 (2.99)***	1.028 (2.15)**	0.776 (1.90)*	1.038 (2.68)***	0.942 (3.91)***
FINANCE	0.530 (1.29)	0.683 (1.64)	0.511 (1.23)	0.575 (2.41)**	0.725 (1.50)	0.459 (1.05)	0.484 (1.13)	0.534 (2.10)**
STAKEHOLDER	−0.020 (−0.09)	0.061 (0.30)	−0.028 (−0.14)	−0.008 (−0.07)	0.070 (0.29)	0.251 (1.12)	0.251 (1.18)	0.197 (1.53)
LEGAL	0.437 (1.98)**	0.206 (0.95)	−0.215 (−1.08)	0.112 (0.94)	0.512 (2.22)**	0.136 (0.62)	−0.241 (−1.15)	0.090 (0.75)

(*continued on next page*)

TABLE 5 (continued)

	Sample Including Environmental Reports				Sample Excluding Environmental Reports			
Assurance Provider	2002 n = 192	2003 n = 208	2004 n = 234	2002–2004 n = 634	2002 n = 138	2003 n = 161	2004 n = 212	2002–2004 n = 511
Constant	−2.723	−0.665	−1.977	−1.776	−4.156	−1.028	−1.697	−1.970
	(−1.89)*	(−0.51)	(−1.54)	(−2.35)**	(−2.29)**	(−0.74)	(−1.27)	(−2.41)**
Ln(SALES)	0.143	0.082	0.259	0.170	0.201	0.147	0.232	0.200
	(1.36)	(0.79)	(2.49)**	(2.90)***	(1.50)	(1.25)	(2.09)**	(2.97)***
LEVERAGE	−1.240	−3.445	−1.114	−1.828	−1.731	−3.623	−1.465	−2.185
	(−1.00)	(−2.53)**	(−0.93)	(−2.58)**	(−1.00)	(−2.31)**	(−1.18)	(−2.72)***
ROA	0.870	−3.99	−3.759	−1.949	1.408	−4.856	−3.218	−2.185
	(0.32)	(−1.86)*	(−1.18)	(−1.56)	(0.33)	(−2.01)**	(−0.94)	(−2.72)*
MINING	1.235	0.550	0.596	0.716	2.113	0.864	0.581	0.918
	(1.47)	(0.66)	(0.77)	(1.55)	(1.79)*	(0.99)	(0.75)	(1.85)*
PRODUCTION	0.137	0.363	−0.409	0.009	1.058	0.631	−0.386	0.231
	(0.23)	(0.62)	(−0.75)	(0.03)	(1.11)	(0.99)	(−0.70)	(0.62)
UTILITIES	0.598	1.073	−0.157	0.463	1.434	1.255	−0.196	0.590
	(0.88)	(1.50)	(−0.26)	(1.22)	(1.25)	(1.58)	(−0.31)	(1.35)
FINANCE	0.605	0.205	−0.005	0.247	1.424	0.374	0.004	0.382
	(0.88)	(0.30)	(−0.01)	(0.65)	(1.34)	(0.52)	(0.01)	(0.91)
STAKEHOLDER	1.870	1.174	1.065	1.279	1.914	1.048	1.061	1.210
	(3.85)***	(3.04)***	(2.89)***	(5.62)***	(3.21)***	(2.50)**	(2.80)***	(4.96)***
LEGAL	−0.184	−0.513	−0.481	−0.429	−0.051	−0.705	−0.486	−0.493
	(−0.35)	(−1.17)	(−1.24)	(−1.70)*	(−0.08)	(−1.52)	(−1.27)	(−1.87)*
Log pseudolikelihood	−1670.91	−1700.88	−1749.66	−5147.14	−1193.20	−1277.95	−1453.73	−3950.37
(Wald chi-squared)	(1049.12)***	(1109.98)***	(1145.41)***	(3296.11)***	(821.45)***	(897.06)***	(982.96)***	(2686.14)***

*, **, *** Significantly different from zero at the $\alpha = 0.10$, 0.05, and 0.01 levels, respectively, for two-tailed tests.

credibility. Our results demonstrate the demand for assurance is higher among companies engaging in more highly visible industrial activity and companies with a larger "social footprint," with companies in *MINING*, *UTILITIES*, and *FINANCE* all being more likely to have their sustainability reports assured. We also find that companies in stakeholder countries are more likely to have their sustainability reports assured. However, this latter finding must be considered in light of the additional analysis reported in this paper that shows that this result is attributable to a U.S. effect. The results further suggest that sustainability reports in the stronger legal system are more likely to be assured, although the decrease in this variable's significance over the period of the study suggests that this factor is less significant in 2004 than it was in 2002, possibly as a result of the evolution and greater acceptance of this assurance service in the global market over this period of time.

With respect to the choice of assurance provider, we do not find that companies domiciled in countries with weak legal environments or belonging to industries with higher environment and social risks are more likely to choose a member of the auditing profession as their assurance provider. Combining the findings of the decision to purchase assurance and the choice of provider, the important decision for industries needing to enhance credibility appears to be the decision to assure the information in the sustainability report, and the determination of whether the assurance provider is a member of the auditing profession is less important.

We do find strong evidence of an association between the choice of assurance provider and the stakeholder orientation of a company's country of domicile, with companies from stakeholder-orientated countries being more likely to choose a member of the auditing profession as their assurance provider. As distinct from the analysis of the assurance decision, this finding holds irrespective of whether the U.S. observations are included or excluded. This finding shows the importance of considering country-specific characteristics in gaining an understanding of the international assurance market. This is further reinforced by the fact that the initial result of a positive association between stakeholder-oriented countries and the decision to assure (but not the choice of assurance provider) is attributable entirely to the U.S. Considering country-specific characteristics is particularly important for understanding global assurance services, where the U.S. has historically had regulations in place that are unique to that country. Hence, our results contribute to the growing body of literature highlighting the importance of county-specific factors when considering accounting and assurance issues at an international level.

These conclusions must be moderated by the following considerations. First, while the search techniques for identifying publicly available sustainability reports were comprehensive, they were not exhaustive. In particular, there is the possibility of a bias against reports that were not translated into English. Nonetheless, there were still a significant number of observations from non-English-speaking countries, including the fact that the highest number of observations came from Japan. We also note that the representation of countries in this study is consistent with surveys examining the extent to which companies prepare sustainability reports (KPMG 2005). Additionally, the requirement to supplement the reports by financial and other information for the purpose of the analysis means that smaller companies are less likely to be included in our analysis as they are less likely to appear on the types of databases used to provide the additional financial and other information.

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An Examination of Corporate Tax Shelter Participants

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ABSTRACT: Recent evidence suggests that corporate tax shelters have become important corporate instruments for reducing tax burden. Based on a sample of identified tax shelter participants, I develop a profile of the type of firm that likely engages in tax sheltering. The model detects tax shelter participants through the use of variables predicted to be either affected by or associated with tax sheltering. I find that firms actively engaged in tax sheltering exhibit larger *ex post* book-tax differences and more aggressive financial reporting practices. Using this model of tax shelter firm characteristics, I identify a broad sample of predicted tax shelter firms from the population of firms. I then examine whether tax sheltering is associated with wealth creation for shareholders or with managerial opportunism. I find that active tax shelter firms with strong corporate governance exhibit positive abnormal returns. This finding is consistent with tax sheltering being a tool for wealth creation in well-governed firms.

Keywords: *tax shelter; book-tax differences; aggressive financial reporting; corporate governance.*

Data Availability: *Data used in this study are available upon request.*

I. INTRODUCTION

In June 2006, IRS Commissioner Mark Everson warned a U.S. Senate panel that tax arbitrage strategies were on the rise and among the most significant enforcement problems the agency faces (Drucker 2006). Bankman (1999) estimates that U.S. firms avoid more than $10 billion annually in federal income taxes through the use of tax shelters. Among 33 identified corporate tax shelter participants in this study, the mean federal tax

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deficiency associated with the use of tax shelters is more than $375 million. These statements and findings suggest that tax shelters are an important instrument for reducing the tax burden of many corporations.

Despite the significant tax savings generated by corporate tax shelters, it is difficult to identify whether a firm is actively participating in one. Firms generally do not disclose their tax shelter involvement, and even when it becomes known *ex post* that a firm has participated in a tax shelter, it is often impossible to determine the dollar amount of the tax benefit using only the firm's financial statements (McGill and Outslay 2004). Consequently, researchers have limited understanding of how to identify tax shelter participants through financial statement analysis.

This study examines the financial reporting effect of tax shelter participation on a sample of 59 firms accused by the government of engaging in tax shelter activity. I develop a model of tax shelter participation using a sample of identified tax shelter firms. To determine whether tax-sheltering activity leaves a detectible footprint in the financial statements, this model identifies firm-specific characteristics that result *from* tax shelter participation (e.g., large differences between financial reporting income and taxable income). The model also identifies firm characteristics associated with the type of firm likely engaged in tax-sheltering activity (e.g., firm size and a tendency toward aggressive financial reporting). Developing a model that identifies aggressive corporate tax shelter participants is important to investors in assessing the effectiveness of management's tax-planning strategies. Identifying tax shelter participants is also critical for researchers investigating whether tax shelters create shareholder wealth or represent opportunistic management behavior.

I predict and find that book-tax differences (BTDs) are positively associated with the incidence of tax sheltering. This result holds when the actual tax shelter participants are compared with either a size- and industry-matched control sample or a broader set of control firms. Using court documents and financial reports, I identify the amount of federal tax savings associated with the tax shelters for 33 of the sample firms. The federal tax savings generated from the identified tax shelters increase reported book-tax differences by an average of 102 percent during the years of active tax shelter participation.[1] When the BTDs of the 33 firms are adjusted for the federal tax savings generated by the tax shelters, their BTDs no longer significantly differ from those of the matched control firms. I also document a positive association between discretionary accruals and the cases of tax sheltering. Discretionary accruals do not, however, fully explain the BTD result, which means that BTDs contain information about aggressive tax reporting unrelated to discretionary accruals and accrual-based earnings management. Together, these findings suggest the impact of tax shelter participation on reported BTDs is significant and that BTDs are incrementally useful in identifying tax shelter participants among a cross-section of firms.

To illustrate the applicability of the tax shelter model in other research settings, I provide preliminary evidence regarding whether tax shelter use is consistent with managers maximizing shareholder value or if it signals managerial opportunism.[2] Desai and Dharmapala (2006) conjecture that elaborate tax shelter schemes can facilitate dishonesty on on management's part rather than increase shareholder wealth. To test this conjecture, I examine the stock return performance of the sample firms for the periods before, during, and immediately after their tax shelter participation using the four-factor Fama and French (1993) model. I find actual tax shelter firms with strong corporate governance scores report significantly higher abnormal returns during the period of active tax shelter participation than do tax shelter firms with poor corporate governance or samples of well-governed and poorly governed control firms. Tests examining the stock return performance of the broader sample of predicted tax shelter firms support these results. Taken together, these findings are consistent with tax sheltering creating wealth for shareholders of well-governed firms.

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[1] Eight of the 33 sample firms did not recognize the tax benefit generated by the identified tax shelter during the period of active tax shelter participation. Consequently, for these eight firms it is unlikely their reported book-tax differences were affected by the identified tax shelter. This issue is discussed in more detail in the following section.

[2] In this study I use the term "managerial opportunism" in a broad sense to mean any management actions inconsistent with shareholder interests, including the excess consumption of perquisites or the pursuit of activities designed to mislead investors. The use of this term is consistent with the discussion of managerial diversion in Desai and Dharmapala (2006).

This study builds on the Graham and Tucker (2006) model of tax shelter participation by considering a more comprehensive set of firm characteristics, including the existence of foreign operations, book-tax differences, and financial reporting aggressiveness. This study also extends recent research on the usefulness of BTDs as a proxy for tax aggressiveness. Existing research provides evidence consistent with BTDs being, at least in part, attributable to aggressive financial reporting (e.g., Phillips et al. 2003; Hanlon 2005). In contrast, Desai (2003) argues that the increase in BTDs in the 1990s is consistent with increasing levels of tax sheltering. I find evidence consistent with BTDs being a useful proxy for tax aggressiveness in a powerful setting where it is clear *ex post* that firms were aggressive in their tax reporting as evidenced by their participation in publicly identified tax shelters.[3] This association alone, however, does not rule out the possibility that BTDs reflect *both* tax and financial reporting aggressiveness.

This investigation also extends recent research investigating whether tax aggressiveness signals an overall aggressive corporate environment. I test whether firms engaged in tax sheltering also exhibit more aggressive financial reporting practices. Using unexplained or residual permanent BTDs as their proxy for aggressive tax reporting, Frank et al. (2009) find that aggressive financial reporting is associated with aggressive tax reporting. I provide additional evidence regarding this relationship by including a measure of financial reporting aggressiveness in a comprehensive model of tax shelter participation and documenting its association with actual cases of tax sheltering.

Finally, I use the model of tax shelter participation developed in this study and the sample of identified tax shelter firms to provide preliminary evidence on the association between tax sheltering and shareholder/manager incentive alignment. Building on the theoretical framework developed by Desai and Dharmapala (2006), I predict and find that corporate governance is an important mediating factor in determining whether tax sheltering is associated with wealth creation for shareholders or with managerial opportunism.

The next section analyzes identified tax shelter firm characteristics. Section III develops the model to identify tax shelter participants. Section IV discusses the results. Section V discusses the tests investigating the association between managerial opportunism and tax sheltering. Section VI concludes.

II. CHARACTERISTICS OF TAX SHELTER FIRMS

The U.S. Congress, Joint Committee on Taxation (1999) defines a corporate tax shelter as a plan or arrangement designed principally to avoid or evade federal income tax without exposure to economic risk or loss. Bankman (1999) offers a more creative definition, "a tax shelter can be defined as a product whose useful life is apt to end soon after it is discovered by the Treasury." Specifically, Bankman (1999) argues that tax shelters are tax-motivated transactions based on a literal interpretation of government regulations inconsistent with the original intent of the legislation. The tax shelter sample in this study is limited to firms either accused by the Treasury or identified in the press as tax shelter participants.

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[3] I use an estimate of book-tax differences designed to reflect both temporary and permanent differences. I use this measure because different types of tax shelters can lead to either permanent or temporary differences. See the Appendix for a description of the financial reporting implications for the sample tax shelters.

Panel A of Table 1 summarizes the sample selection procedure. A combination of two sources determined the selection. One source is Graham and Tucker (2006), who searched Tax Court dockets and the popular press to identify 43 public corporations accused of tax sheltering between 1975 and 2000. Eighteen additional corporate tax shelter participants identified from the Factiva Database augment this sample. I searched the period between January 1, 1990, and December 31, 2007, using the key words "tax shelter" and "corporat.*" As Panel B of Table 1 indicates, many of the shelters span multiple years; consequently the sample comprises 215 firm-year tax shelter observations.

The tax shelters in this study include: 16 cases involving transfer pricing; 12 corporate-owned life insurance (COLI) transactions; seven contingent-payment installment sales;

TABLE 1
Tax Shelter Sample Selection and Characteristics

Panel A: Summary of Sample Selection Criteria

Total sample of tax shelter firm observations from Graham and Tucker (2006)	43
Additional tax shelter firm observations obtained from Factiva database search	18
Less firm observations without the necessary data to calculate book-tax differences	(2)
Firms with an active tax shelter and complete data	59

Panel B: Fiscal Year Firms Engaged in Tax Sheltering

Fiscal Years	Number of Firm-Years
1975–1979	22
1980–1984	36
1985–1989	23
1990–1994	64
1995–1999	54
2000–2002	16
Total	215

Panel C: Industry Distribution of Sample Firms

SIC Code	Industry Type	Number of Firms
1–999	Agriculture, Forestry, Fishing	0
1000–1999	Mining, Building	0
2000–2999	Construction	20
3000–3999	Manufacturing	15
4000–4999	Transportation, Communication, Electric, Gas	8
5000–5999	Wholesale, Retail	6
6000–6999	Financial Services	5
7000–7999	Hotels, Services	3
8000–8999	Services	1
9000–9999	International, Non-Operating	1
Total		59

seven contested liability accelerations; four lease-in, lease-out (LILO) deals; two cross-border dividend capture cases; two intellectual property havens; two 401(k) Accel shelters; and seven shelters categorized as other.[4] The Appendix presents a summary of each type of tax shelter and the potential financial reporting implications.[5]

Book-Tax Differences

I begin developing a profile of tax shelter firms by examining the effect of tax-sheltering activity on BTDs. The difficulty of identifying aggressive-tax-reporting firms stems in part from the ongoing uncertainty regarding the causes of BTDs. Previous research suggests aggressive financial reporting partially causes large positive BTDs. Hanlon (2005) finds firms with large positive temporary BTDs have less persistent GAAP earnings and concludes that investors appear to view large positive BTDs as a "red flag" indicating low-quality earnings. Lev and Nissim (2004) support this view, finding the ratio of tax-to-book income predicts earnings growth for up to five years ahead.

Recent research also suggests that large positive BTDs signal tax aggressiveness. Desai (2003) argues the divergence between book and tax income during the 1990s was not attributable to traditional drivers of book-tax differences, such as depreciation, but instead to increased levels of tax sheltering. Heltzer (2008) concurs, finding results consistent with BTDs providing insight into a firm's relative level of tax reporting aggressiveness but not a firm's relative level of financial reporting aggressiveness.[6] In a contemporaneous study, Desai and Dharmapala (2007) examine 14 firms involved in tax shelter litigation and find a positive association between incidence of tax sheltering and book-tax differences. Frischmann et al. (2008) find BTDs are positively associated with firms' contingencies for uncertain tax benefits.

That firm-specific characteristics independent of aggressive tax or book reporting strategies often cause BTDs complicates their use as a signal of aggressive tax reporting. Examples include normal temporary differences such as those resulting from differences in the rates of depreciation between the two systems of accounting. BTDs also arise from normal permanent differences such as the interest on tax-exempt municipal bonds, which is included in book income but excluded from taxable income. Hanlon (2003) and McGill and Outslay (2004) identify a number of factors complicating inferences about the degree of sheltering activity in which a firm has engaged based simply on its BTDs.

I begin my analysis of the association between BTDs and tax sheltering by examining the BTDs of the identified tax shelter firms. Panel A of Table 2 provides descriptive statistics for the 33 tax shelter firms where I am able to identify the extent of the federal tax savings resulting from the tax shelter. The mean (median) federal tax savings resulting from the tax shelters is \$375.5 (\$66.5) million. These numbers likely understate the total value of the tax shelter to the firm because they do not include potential state income tax savings from the tax shelters. The final column of Panel A lists the sources used to identify the tax

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[4] In a contemporaneous study Brown (2008) uses a sample of COLI participants to model a firm's decision to adopt a tax shelter.

[5] Graham and Tucker (2006) also provide an excellent summary of each type of shelter along with key judicial doctrines related to tax sheltering.

[6] Using the Basu (1997) measure of conservatism, Heltzer (2008) examines the level of financial-reporting and tax-reporting conservatism for firms with large positive BTDs and finds the financial-reporting conservatism for these firms is similar to that of other sample firms. However, applying the same measure of conservatism to taxable income, she finds that firms with large positive BTDs do exhibit more conservative (and therefore, from a tax perspective, more aggressive) tax reporting.

TABLE 2
Tax Shelter Firms and Types

Panel A: Estimated Federal Tax Savings and Financial Reporting Effects of Tax Shelter Activity (all dollar amounts are in thousands)

Obs.	Firm	Shelter Type	Tax Shelter Years	Federal Tax Savings	Reported BTD	Revised BTD	Reported ETR	Revised ETR	Recognized Benefit	Source
1	IES Industries	CBDC	1991–1992	25,977	−12,740	−89,142	33%	51%	Yes	253 F.3d 350
2	Compaq Computer	CBDC/TP	1991–1992	79,338	175,630	−57,718	23%	37%	Uncertain	T.C. Memo. 1999-220
3	American Electric Power	COLI	1990–1996	319,000	635,510	−284,682	29%	35%	Yes	136 F. Supp. 2d 762
4	CM Holdings Inc.	COLI	1991–1994	4,400	−1,940	−14,694	27%	36%	Uncertain	No. 00-3875
5	Dow Chemical Co.	COLI	1989–1991	30,304	−683,590	−772,721	35%	35%	Yes	No. 03-2360
6	Ruddick Corp.	COLI	1993–1998	25,000	113,330	41,901	34%	40%	Yes	2000 Quarterly Report
7	Winn-Dixie	COLI	1993	1,599	57,770	53,201	35%	35%	Yes	113 T.C. 254
8	Donnelley RR and Son Inc.	COLI	1990–1998	185,000	410,590	−123,064	32%	37%	Yes	2001 Annual Report
9	W. R. Grace & Co.	COLI	1989–1998	53,500	−650,670	−805,742	23%	24%	Yes	2002 Form 8-K
10	AlliedSignal	CPIS	1990–1992	183,048	214,000	−324,375	9%	18%	Uncertain	76 T.C.M. (CCH) 325
11	American Home Products	CPIS	1990–1993	261,800	2,330,480	1,566,100	29%	33%	Uncertain	No. 01-5429
12	Black & Decker	CPIS	1998	113,000	−871,160	−871,160	45%	45%	No	Leone, 2004
13	Brunswick	CPIS	1990–1991	66,476	−105,090	−105,090	53%	53%	No	T.C. Memo. 1999-359
14	Colgate-Palmolive	CPIS	1988	33,320	−87,440	−185,440	27%	30%	Uncertain	73 T.C.M. (CCH) 2189
15	Coltec Industries Inc.	CPIS	1996	82,800	52,050	52,050	29%	29%	No	No. 06-659
16	BB&T Corp.	LILO	1996–1998	3,296	921,300	921,300	27%	27%	No	No. 1:04CV00941
17	Florida Power and Light	OTHER	1992–1994	114,580	260,240	−70,279	35%	40%	Uncertain	80 T.C.M. (CCH) 686
18	Bmc Software Inc.	OIPH	1993	24,125	−17,020	−17,020	28%	28%	No	73 F. Supp. 2d 751

(continued on next page)

TABLE 2 (continued)

Obs.	Firm	Shelter Type	Tax Shelter Years	Federal Tax Savings	Reported BTD	Revised BTD	Reported ETR	Revised ETR	Recognized Benefit	Source
19	Merck	OIPH	1993–2001	1,600,000	10,133,470	10,133,470	30%	30%	No	Drucker, 2006
20	UPS	OTHER	1983–1984	67,201	684,800	538,710	43%	47%	Yes	T.C. Memo. 1999-268
21	Yum Brands	OTHER	1999	39,375	−70,571	−183,071	38%	41%	Uncertain	(Browning, 2005)
22	Bausch & Lomb	TP	1983–1987	41,574	211,530	118,730	33%	41%	Uncertain	T.C. Memo. 1996-57
23	Boeing Co.	TP	1979–1987	419,000	3,658,500	3,658,500	28%	28%	No	258 F.3d 958
24	Computervision Corp.	TP	1981	9,460	52,570	32,004	31%	49%	Uncertain	T.C. Memo. 1996-131
25	Exxon Corp.	TP	1980–1982	6,535,479	9,402,500	−4,805,063	52%	52%	Uncertain	T.C. Memo. 1993-616
26	Texaco Inc.	TP	1979–1982	1,575,870	1,359,570	−2,066,234	47%	58%	Uncertain	T.C. Memo. 1993-616
27	General Electric Capital Corp	TP	1993–1998	62,212	21,750,970	21,750,970	30%	30%	No	342 F. Supp. 2d 94
28	Intel Corp.	TP	1978–1980	35,877	77,920	1,041	48%	57%	Uncertain	76 F.3d 976
29	National Semiconductor	TP	1976–1981	75,952	116,300	−44,615	45%	71%	Yes	T.C. Memo 1994-195
30	Microsoft Corp.	TP	1987–1989, 1991	45,138	89,890	−37,260	32%	35%	Yes	T.C. Memo. 1998-54
31	Phillips Petroleum	TP	1979–1982	173,666	−2,817,280	−3,194,815	66%	67%	Uncertain	104 T.C. 256
32	Chevron Corp.	TP	1977–1978	77,896	4,921,840	4,759,556	42%	43%	Uncertain	104 T.C. 719
33	Perkin-Elmer Corp.	TP	1975–1981	26,137	90,320	34,539	41%	45%	Uncertain	T.C. Memo 1993-414
			Mean	375,497	1,587,987	897,269	35%	40%		
			Median	66,476	113,330	−37,260	33%	37%		

(continued on next page)

TABLE 2 (continued)

Panel B: Additional Descriptive Statistics for Tax Shelter Sample

	Obs.	Mean	Median	Mean % of Tax Savings
Estimated percentage reduction in effective tax rate resulting from tax shelter activity	33	5.10%	3.62%	NA
Estimated percentage increase in book-tax differences resulting from tax shelter activity	33	101.98%	43.87%	NA
Interest assessed on tax shelter deficiency	14	154,486	43,500	40.00%
Penalties assessed on tax shelter deficiency	5	33,624	14,524	9.26%
Fees paid to tax shelter purveyors as indicated in court documents	7	8,084	6,229	7.92%

Panel A presents descriptive statistics for the subsample of tax shelter firms where I was able to identify the federal tax savings resulting from the tax shelter. The Source column indicates the source of the tax savings data. In most cases this information was gathered from court documents and does not include additional potential state income tax savings that likely resulted from these tax shelters. Reported BTDs are calculated using financial reporting data as described in the text (unscaled) and represent the sum of BTDs for the firm over the entire tax shelter period. The Revised BTD column represents an estimate of what the firm's BTDs would have been had management not recorded the tax benefit associated with the identified tax shelter. Reported ETR represents the traditional effective tax rate measured as the total tax expense divided by pre-tax book income. The Revised ETR represents an estimate of what the firm's reported ETR would have been had management not recorded the tax benefits associated with the identified tax shelter. The recognized benefit column indicates whether the firm recorded the full tax benefit from the identified tax shelter during the period of active tax sheltering. The tax benefit recognition information was gathered from a search of annual reports for the firm during the years of active tax sheltering as well as subsequent years. If the financial statements clearly indicated the firm did not record the tax benefit of the identified tax shelter, then the estimated effect of the tax shelter on the firm's BTDs and ETR during the period of active tax sheltering is zero. Tax shelters resulting in temporary BTDs will also have no effect on the firm's reported effective tax rate. For the above firms just the LILO tax shelter employed by BB&T Corp. is expected to result only in a temporary BTD.

Panel B presents additional descriptive statistics for subsamples of the tax shelter firms. Interest and penalty data was gathered for a subsample of firms using a combination of court documents and the notes from their financial reports. Fees paid to tax shelter purveyors were all gathered from court documents associated with the identified tax shelter. Interest, penalty, and fee amounts are all reported in thousands.

savings. In most cases, court documents associated with the disputed tax shelter provided the data.

Table 2 indicates the mean (median) reported BTDs for the tax shelter firms during the years of positive active tax shelter participation. In order to calculate an estimate of BTDs, I first calculate an estimate of taxable income based on financial statement information. Book income is pre-tax book income (data 170). Taxable income is calculated by grossing up the sum of the current federal tax expense (data 63) and the current foreign tax expense (data 64) using the top statutory tax rate in the applicable year and subtracting the change in NOL carryforward (data 52). If the current federal tax expense is missing, then total current tax expense is calculated by subtracting deferred taxes (data 50), state income taxes (data 173), and other income taxes (data 211) from total income taxes (data 16). The difference between book and tax income results in the BTD. This measure of BTDs reflects both permanent and temporary differences as tax shelters can lead to both types of differences. The BTDs reported in Table 2 are the cumulative BTDs for tax shelter firms for all years they were identified as participating in a given tax shelter.

Next, I calculate a revised estimate of BTDs, removing the effect of the tax-sheltering activity. I begin by investigating whether management of the firm recognized the tax benefits associated with the tax shelter during the tax-sheltering period.[7] I reviewed the financial statement footnotes of each firm for the period of active tax sheltering through the year when the tax dispute was ultimately settled. For ten of the 33 firms, footnotes revealed that the firm had recognized the tax benefit while engaged in the tax sheltering.

Once it is clear a firm recognized the tax benefits, I then calculate the effect of the benefits on the firm's BTDs. The identified federal tax savings are grossed up by the applicable statutory federal corporate tax rate at the time the firm engaged in the tax shelter.[8] I then subtract the grossed-up tax benefit from the firms' reported BTD to calculate a revised BTD. When a review of the financial statements failed to clarify whether a firm recognized the full tax benefit generated by the tax shelter, I made the simplifying assumption that the full benefit was recognized in calculating the revised BTD. The results in Table 2 indicate that when the cumulative BTDs are adjusted to remove the effect of the identified tax shelter, the mean BTD remains positive but is reduced by 102 percent and the median BTD actually becomes negative.

An alternative to recognizing the tax shelter benefit would be to record a contingency for the tax position if management believed it probable the relevant tax authority would successfully challenge it. Pursuant to SFAS No. 5 (FASB 1975) firms must accrue a loss contingency for uncertain tax positions if the loss is probable and reasonably estimable.[9] For eight of the 33 firms in Panel A footnote disclosures made it clear that management had not recognized any of the benefit associated with the tax shelter. Consequently, their BTDs were not affected by their tax shelter participation.[10]

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[7] Recognizing means recording a financial statement benefit and could involve recording a smaller current tax expense or reducing an existing tax-related liability.

[8] If the statutory federal corporate tax rate changed during the years a firm engaged in tax sheltering, then I attempted to identify the federal tax savings for each respective year and gross those amounts up by the applicable rates for each year. However, if I was unable to determine the tax benefits for each respective year, then I used the average corporate statutory tax rate over all the years the firm engaged in the tax shelter.

[9] Gleason and Mills (2002) find that for a sample of 100 large manufacturing firms over the nine-year period from 1987–1995 only 27 percent of the firms disclose any contingent tax liability and only 30 percent of those firms provide all the disclosures required by SFAS No. 5. These findings suggest that not all firms were using the guidance provided by SFAS No. 5 in determining whether to disclose contingencies associated with income taxes. Consistent with this finding, for 15 of the tax shelter firms identified in Panel A of Table 2, I was unable to clearly determine whether they had recorded a contingency for the tax benefit generated by the identified tax shelter.

Additional Tax Shelter Characteristics

Panel A of Table 2 also reports the effective tax rates (ETRs) of the tax shelter firms during the period of active tax sheltering and an estimation of what their effective tax rates would have been absent the tax shelter activity. The effective tax rate is calculated as the total tax expense divided by pre-tax book income and averaged over the years the firm was identified as participating in a given tax shelter. Consistent with the adjustment of the cumulative BTDs for the effect of tax sheltering, the ETRs of the firms that booked contingencies associated with their tax shelter positions are not adjusted.[11] The median unadjusted ETR reported by the tax shelter firms was 33 percent and the median adjusted ETR is estimated at 37 percent. This analysis likely understates the impact of tax sheltering on the ETR of these firms because of the state tax benefit also generated from the sheltering activity.

Panel B of Table 2 provides additional descriptive statistics for the tax shelter cases. In 14 cases I was able to identify the original amount of interest assessed by the IRS related to the tax deficiency stemming from the tax shelter activity. For these cases, the mean amount of interest assessed was $154.5 million, representing on average 40 percent of the total tax deficiency. Further, I was able to identify the proposed penalties assessed by the IRS for nine of the cases, which on average amounted to 9.26 percent of the proposed tax deficiency. These findings suggest the interest and penalties associated with tax sheltering represent an economically significant cost to the firms should the IRS successfully challenge these transactions. Finally, in seven of the cases I was able to identify the total fees firms paid to tax shelter purveyors to implement the tax shelter. On average these fees amounted to $8 million or 7.92 percent of the federal tax savings generated from the shelter. Examining 365 large U.S. corporations, Mills et al. (1998) find that an additional $1 investment in tax planning results in a $4 reduction in tax liabilities. While my findings suggest a larger return to tax-planning costs for these firms, I do not include the in-house costs associated with implementing these shelters, which are also likely economically significant.

Tax Shelter Firms and Control Firms

I select the control sample for this study using the following three criteria: (1) fiscal year, (2) two-digit SIC code, and (3) nearest total assets (data 6) in the current year. I match on size because size is a key condition for engaging in most of the tax shelters examined in this sample given their scale and complexity. For the primary analysis of tax shelter firm characteristics, I collapse the years a firm was alleged to have engaged in tax sheltering into a single "event year" by averaging the corporate data for that firm over all the years a shelter occurred. Graham and Tucker (2006) note this approach helps to address concerns about the lack of independence among multiple observations from the same firm. The control firms are matched to the tax shelter firms in the initial year of tax sheltering and, consistent with the shelter firms, the corporate data for each control firm is averaged over the years its matched shelter firm was actively sheltering.

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[10] If ultimately some portion of the tax benefit derived from the tax shelter was sustained upon examination, then the firm would recognize this benefit at the time the dispute was resolved and presumably reduce its tax expense (increase income) and increase its reported BTDs at that time. A review of the tax footnotes revealed that nine of the firms appear to have recorded a contingency at the time the IRS initially challenged the tax shelter. These cases occurred after the conclusion of the identified tax shelter activity and did increase these firms' effective tax rate when they were recorded.

[11] BTDs resulting from differences in the timing of recognition for an expense or income item between book and tax reporting would not result in a reduction in the effective tax rate as calculated in this analysis. Just one of the 33 tax shelters identified in Table 2 is expected to generate only temporary book-tax differences. That tax shelter is the lease-in, lease-out (LILO) tax shelter employed by BB&T Corporation. See the Appendix for a discussion of the financial reporting treatment of this particular tax shelter.

Panel A of Table 3 presents the descriptive statistics for the 33 tax shelter firms where I was able to identify the amount of the federal tax savings generated by the tax shelter and the set of matched control firms. The results in Table 3 indicate the control firms hold significantly more debt and have lower BTDs than the sample of tax shelter firms. The control firms are also marginally significantly ($p < 0.15$) less profitable and incur marginally significantly fewer research and development expenses than the identified tax shelter firms. There is, however, no significant difference between the tax shelter firms and control firms in terms of the level of foreign income or the level of discretionary accruals.

The results in Panel A of Table 3 indicate the median ETRs of the tax shelter firms are lower than those of the matched control firms. When the effects of the tax shelter activity are removed, however, the median adjusted ETR of the shelter firms is almost identical to the median ETR of 37 percent reported by the matched control firms. Similarly, when the scaled BTDs of the tax shelter firms are adjusted for the effects of the tax-sheltering activity, the results in Panel A indicate they are no longer significantly greater than the BTDs of the matched control firms. This finding suggests the difference in the BTDs of the tax shelter firms and control firms is largely a function of the tax-sheltering activity.

Figure 1 depicts the median aggregate BTDs of the 33 identified tax shelter firms with available tax savings data and the set of 33 matched control firms in the years surrounding the period of active tax sheltering. In Figure 1, Year 0 represents the active tax shelter years and is the median BTD for the firms during those years. Years −3 through −1 represent the years immediately preceding the initial year of tax shelter participation, and Years +1 and +2 represent the years immediately following the final year of active tax sheltering. Consistent with the scaled BTD results reported in Table 3, the median aggregate BTDs of the tax shelter firms exceed those of the matched control firms during the years of active tax sheltering as well as the years immediately preceding and following the tax-sheltering activity. Interestingly, there is a clear spike in the BTDs of the tax shelter firms during active tax shelter years represented by Year 0. This finding is consistent with the analysis in Table 2, indicating that tax-sheltering activity has a significant impact on BTDs.

Figure 1 also depicts the median aggregate BTDs of the tax shelter firms adjusted for the impact of the tax shelter activity during the year of active sheltering. Adjusting for the effect of the tax-sheltering activity leads to a clear drop in the BTDs of the median tax shelter firm even relative to the years preceding and following the tax shelter activity. That the BTDs of the tax shelter firms exceed those of the matched control firms and exceed the adjusted BTDs during the years of tax sheltering suggests that these firms might have been involved in other types of tax shelter activity in the years surrounding the tax shelter identified in this study.

III. DEVELOPING A MODEL TO IDENTIFY TAX SHELTER PARTICIPANTS

The above analysis suggests that tax shelter firms exhibit characteristics such as large BTDs that might be useful in attempting to identify active tax shelter participants. The next step in this analysis is to develop a model to identify active tax shelter participants from a

TABLE 3
Descriptive Statistics

Panel A: Summary Statistics

	Tax Shelter Samplte						Matched Control Sample						
	n	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**n**	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**Prob[a] (Median Control: Median Test)**
SIZE	33	3.54	3.60	0.69	2.18	4.57	33	3.44	3.49	0.72	2.18	4.57	0.59
LEV	33	0.18	0.14	0.17	0.00	0.86	33	0.29	0.22	0.23	0.05	1.14	0.00
ROA	33	0.15	0.13	0.14	−0.11	0.61	33	0.10	0.09	0.12	−0.18	0.36	0.12
FOREIGN PRE-TAX INCOME	33	0.02	0.00	0.03	0.00	0.10	33	0.01	0.00	0.03	−0.04	0.10	0.17
R&D	33	0.05	0.02	0.07	0.00	0.23	33	0.03	0.01	0.05	0.00	0.22	0.10
BTD	33	0.02	0.01	0.07	−0.16	0.23	33	−0.01	0.00	0.07	−0.25	0.09	0.02
ETR	33	35.10%	32.79%	10.71%	8.92%	65.65%	33	37.66%	37.89%	22.55%	−16.30%	9.33%	0.11
Adjusted ETR	33	40.20%	37.37%	12.15%	17.52%	70.74%	33	NA	NA	NA	NA	NA	0.46[b]
Adjusted BTD	33	0.01	0.00	0.07	−0.23	0.23	33	NA	NA	NA	NA	NA	0.6[b]
DAP	33	−0.01	−0.01	0.04	−0.07	0.12	33	−0.02	−0.01	0.06	−0.27	0.04	0.18

(*continued on next page*)

TABLE 3 (continued)

Panel B: Pearson and Spearman Correlation Coefficients[c]

	SIZE	*LEV*	*ROA*	*FOREIGN INCOME*	*R&D*	*BTD*	*DAP*
SIZE		−0.11	**−0.29**	−0.07	**−0.25**	**−0.26**	0.12
LEV	−0.09		**−0.35**	−0.16	**−0.29**	−0.16	−0.12
ROA	**−0.32**	**−0.33**		**0.48**	**0.50**	**0.49**	0.04
FOREIGN INCOME	−0.11	−0.06	**0.29**		**0.54**	**0.30**	0.03
R&D	**−0.25**	**−0.29**	**0.46**	**0.53**		**0.19**	−0.12
BTD	**−0.22**	**−0.19**	**0.50**	0.10	0.15		0.17
DAP	**0.20**	0.08	−0.10	−0.10	**−0.25**	0.06	

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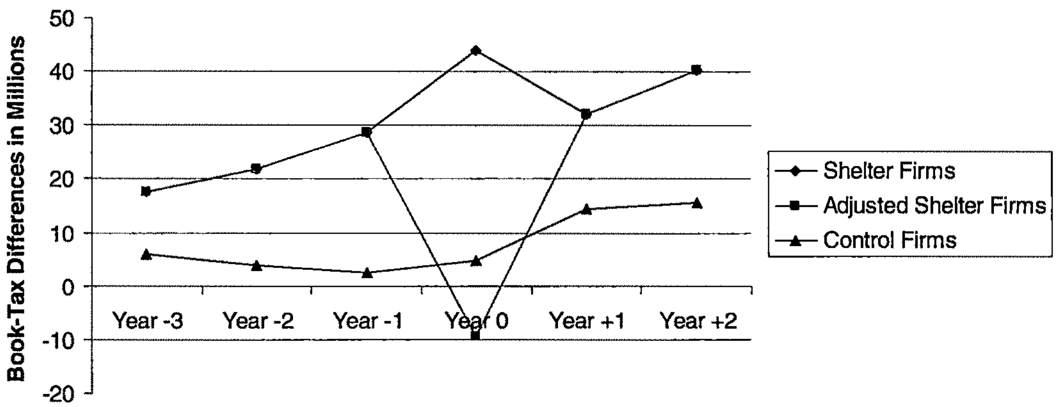
[a] Wilcoxon test (two-tailed). *SIZE* is the log of total assets (data 6). *LEV* is long-term debt (data 9) divided by total assets. *ROA* is pre-tax earnings (data 170) divided by total assets; *FOREIGN PRE-TAX* is (data 273) divided by lagged total assets. *R&D* is (data 46) divided by lagged total assets. *BTD* is book income less taxable income scaled by lagged total assets. Book income is pre-tax income (data 170). Taxable income is calculated by grossing up the sum of the current federal tax expense (data 63) and the current foreign tax expense (data 64) and subtracting the change in NOL Carryforward (data 52). If the current federal tax expense is missing, then total current tax expense is calculated by subtracting deferred taxes (data 50), state income taxes (data 173) and other income taxes (data 211) from total income taxes (data 16). *DAP* is discretionary accruals from the performance-adjusted modified cross-sectional Jones Model. *Adjusted ETR* and *Adjusted BTD* variables have been re-calculated to remove the effect of identified tax shelter activity. All variables are calculated as the average value of the variable reported by the firm during the active tax shelter years. All variables have been winsorized at the 1st and 99th percentiles.

[b] For the *Adjusted ETR* and *Adjusted BTD* variables the test of the difference in medians compares the median adjusted ETR and BTDs for the tax shelter firms with the median un-adjusted ETR and BTDs for the control firms.

[c] The upper (lower) diagonal reports Pearson (Spearman) correlations and all reported correlations that are significant at $p < 0.10$, two tailed, are bolded.

FIGURE 1
Median Book-Tax Differences Surrounding Tax Shelter Activity



This figure depicts the median aggregate book-tax differences calculated using financial reporting data for the sample of tax shelter firms and the matched control firms. Year 0 represents the active tax shelter years and is the median book-tax difference for the firms during those years. Note this figure represents the median aggregate BTD per year of tax sheltering. The BTD figures reported in Table 2 are the sum of BTDs for all the years of tax sheltering. Years −3 through −1 represent the years immediately preceding the initial year of tax shelter participation, and Years +1 and +2 represent the years immediately following the final year of active tax sheltering. The book-tax difference for the adjusted tax shelter firms represents an estimate of what the reported book-tax differences would have been had management chosen not to record the tax benefit associated with the identified tax shelter during the years of active tax shelter participation. Consequently, this adjustment only affects Year 0 for the adjusted tax shelter firms and the years preceding and following the tax shelter activity are unchanged.

broader sample of firms. To investigate the characteristics associated with tax shelter participation I estimate a logistic regression of a binary variable (*SHELTER* = 1 or 0) on a set of variables predicted to be associated with tax sheltering. The estimation equation is:

$$\ln \frac{P_{Shelter}}{1 - P_{Shelter}} = \beta_0 + \beta X + \varepsilon \tag{1}$$

where $\ln \frac{P_{Shelter}}{1 - P_{Shelter}}$ is the probability the firm is identified as currently engaged in tax sheltering.

$$\beta X = \beta_1 BTD_{it} + \beta_2 DAP_{it} + \beta_3 LEV_{it} + \beta_4 SIZE_{it} + \beta_5 ROA_{it} + \beta_6 FOREIGN\ INCOME_{it} + \beta_7 R\&D_{it}.$$

Table 4 summarizes the variables predicted to be associated with tax sheltering. The above model of tax shelter participation is nonstandard because it does not attempt to predict which firms will enter into tax shelters in the future. Rather, all the variables are measured during the period of actual tax shelter participation because the purpose of the model is to identify characteristics that can be used to identify firms actively engaged in tax sheltering. The first variable included in the model is BTDs. If large positive BTDs signal aggressive

TABLE 4
Regression Examining Determinants and Characteristics of Tax Shelter Firms
Matched Control Sample

	Pred.	Full Sample			Full Sample			Full Sample			Tax Savings Sample			Tax Savings Sample		
	Sign	Coeff	ΔProb	t-stat	Coeff	ΔProb	t-stat	Coeff	ΔProb	t-stat	Coeff	ΔProb	t-stat	Coeff	ΔProb	t-stat
Intercept	?	−0.67	−0.17	0.55	−0.62	−0.15	0.51	−0.13	−0.03	0.10	−0.16	−0.04	0.09	−0.25	−0.06	0.14
BTD	+	11.11	2.78	2.26**				9.57	2.39	1.84**	8.82	2.20	1.70**			
PERM BTD	+				7.09	1.77	1.45*									
TEMP BTD	+				19.14	4.78	2.17**									
ADJUSTED BTD	+													3.22	0.80	0.71
DAP	+							13.80	3.45	2.18**						
LEV	−	−2.32	−0.58	1.72**	−2.19	−0.55	1.61*	−2.30	−0.58	1.60*	−2.90	−0.72	1.59*	−2.63	−0.66	1.44*
SIZE	?	0.22	0.06	0.83	0.20	0.05	0.73	0.09	0.02	0.30	0.16	0.04	0.40	0.14	0.04	0.36
ROA	+	0.48	0.12	0.19	−0.22	−0.05	0.09	0.41	0.10	0.16	−0.21	−0.05	0.07	1.12	0.28	0.42
FOREIGN INCOME	+	0.55	0.14	1.19	0.30	0.07	0.59	0.53	0.13	1.12	0.50	0.12	0.83	0.40	0.10	0.69
R&D	+	−0.81	−0.20	0.17	1.86	0.46	0.39	1.75	0.44	0.36	0.07	0.02	0.01	0.96	0.24	0.16
Observations			118			118			118			66			66	
Goodness of Fit Statistics																
Pseudo R^2			0.13			0.19			0.17			0.15			0.11	
Chi-Square Test			15.61			18.01			21.77			10.29			7.38	
% Correct			0.70			0.72			0.72			0.72			0.69	

*, **, *** Indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively (one-tailed tests). Tests include an equal number of test and control firms. The t-statistics are for the logit coefficients.

The regressions in columns (1) through (3) contain 59 tax shelter observations and the regressions in columns (4) and (5) contain 33 tax shelter observations. The control sample is selected using the following three criteria: (1) fiscal year, (2) two-digit SIC code, and (3) nearest total assets (data 6) in the current year.

Logit regression estimates of the relation between the likelihood that a firm engages in tax sheltering and proxies for firm characteristics hypothesized to be associated with tax sheltering. The dependent variable, *SHELTER*, is an indicator variable set equal to 1 for firm-year observations where the firm is identified as having an active tax shelter, and set to 0 for all other firm-year observations. *FOREIGN INCOME* is an indicator variable set equal to 1 for firm observations reporting foreign income, and set to 0 for all other observations. *ADJUSTED BTD* is an estimate of the book-tax difference the firm would have reported had management not recorded the tax benefit associated with the identified tax shelter. All other variables are calculated as reported in Table 2. All variables are calculated as the average value of the variable reported by the firm during the active tax shelter years. ΔProb measures the marginal change in the probability of using a tax shelter resulting from a change in the independent variable.

tax reporting, then I expect a positive and significant relation between BTDs and incidence of tax sheltering.[12] It is possible the control sample also includes unidentified users of tax shelters. To the extent the control sample is contaminated with tax shelter participants the power of the tests to detect differences will be lowered.

Hanlon (2003) and Hanlon et al. (2007) identify a number of problems associated with estimating taxable income from the financial statements. Briefly these problems include accounting for the tax benefits of employee stock options, consolidation, intraperiod tax allocation, contingencies for uncertain tax benefits, tax credits, foreign operations, and negative taxable income. Each of the above items could introduce measurement error into my estimate of taxable income. Plesko (1999, 2003) examines how well financial statement numbers correlate with actual tax return numbers. As a part of his analyses, he reports a regression coefficient of 0.986 when actual tax liability before tax credits is regressed on the reported current federal tax expense.[13] This finding provides some support for using financial statement information to calculate a firm's taxable income.

The Association between Aggressive Tax and Financial Reporting

The second variable included in the model, DAP_{it}, is a measure of discretionary accruals. Discretionary accruals are calculated using a cross-sectional modified Jones Model (Jones 1991) with lagged return-on-assets (Kothari et al. 2005).[14] While significant research has been done examining the trade-offs between financial reporting and tax-planning incentives (see Shackelford and Shevlin 2001), little work has been done investigating the connection between aggressive financial and tax reporting. Frank et al. (2009) hypothesize that some firms have a tendency toward aggressive corporate behavior that simultaneously affects financial and tax-reporting choices. Using performance-matched discretionary accruals as their proxy for financial reporting aggressiveness and the unexplained portion of permanent BTDs as a proxy for tax-reporting aggressiveness, Frank et al. (2009) find that firms choosing to report aggressively for book purposes also report aggressively for tax purposes. This study extends the work of Frank et al. (2009) by examining whether a sample of identified tax shelter firms also engages in aggressive financial reporting. If the decision to engage in corporate tax sheltering signals an overall aggressive corporate environment, then I would expect discretionary accruals are positively associated with incidences of tax sheltering.

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[12] An alternative explanation for a positive association between BTDs and actual incidence of tax sheltering is that I am simply modeling the process used by the IRS to detect tax sheltering. Mills (1998) documents a positive association between IRS proposed audit adjustments and the level of a firm's book-tax differences. She also notes that the IRS includes firms in its coordinated examination program on the basis of a point system that measures the size and complexity of the tax return and that the IRS usually audits firms in this program every year. Given that my sample of tax shelter firms and matched firms are large firms, it is reasonable to assume many of these firms are likely subject to annual IRS audits. As a result, the IRS likely uses much more detailed information to audit these firms than aggregate measures such as BTDs that can be calculated from a firm's financial statement disclosures. Nonetheless, it is difficult to completely rule out this alternative explanation.

[13] Plesko (1999) conducts this analysis on a set of carefully selected U.S.-based firms with 1992 financial statement data that was then matched to 1992 tax return data potentially biasing upward the correlation. Plesko (1999) limits the sample to firms with consolidated financial statement assets close to the assets reported on Schedule L of their Form 1120 in an effort to identify firms with limited or no consolidation differences. More recently, using a matched tax return-Compustat-ExecuComp sample from 2000–2004, Lisowsky (2008b) finds that SFAS No. 109 financials statement disclosures are significantly related to the total tax reported on firms' tax returns.

[14] In calculating discretionary accruals, I use a measure of total accruals based on cash flow from operations (data 308) when that data item is available. Specifically, I calculate total accruals as net income before extraordinary items (data 123) minus cash flow from operations scaled by beginning of the year total assets. For all other observations, total accruals are calculated using a balance sheet approach.

Other Characteristics Associated with Tax Sheltering

Dyreng et al. (2008) find that long-run tax avoidance is positively associated with firm size.[15] Because tax shelters represent an extreme case of aggressive tax avoidance, I investigate whether firm size ($SIZE_{it}$) is associated with tax shelter participation. $SIZE_{it}$ is calculated as the log of total assets. Graham and Tucker (2006) find that tax shelter participants use less debt, on average, than does a set of size- and industry-matched control firms. This result is consistent with firms using tax shelter deductions as a substitute for the interest deduction associated with debt. For this reason, I include a firm's leverage ratio (LEV_{it}) in modeling tax shelter participation. I expect the leverage ratio is negatively associated with cases of tax sheltering. LEV_{it} is long-term debt divided by total assets.

Mills and Newberry (2005) provide an alternative explanation for the negative association between leverage and tax shelter participation, suggesting that tax sheltering itself could act to remove debt from a firm's financial statements, thereby lowering leverage. In other words, it is the desire to create off-balance-sheet financing via the tax shelter that causes this negative association rather than tax shelters acting as an additional form of non-debt tax shield. Consistent with this conjecture, Drucker (2006) reports that one of the benefits of the Merck off-shore intellectual property haven tax shelter included in this study was the ability of Merck to use the tax shelter to prevent significant sums of money raised from being recorded as debt on the firm's books.

In an effort to distinguish between these alternative explanations for the negative association between tax sheltering and leverage, I examine the leverage of the tax shelter firms in the three years preceding their tax shelter participation. If one of the motivations for the tax shelter firms to employ the identified tax shelters was to remove debt from their books, then I would expect these firms to report significantly higher leverage ratios prior to engaging in tax sheltering. The results (untabulated) indicate the median leverage ratio was not significantly different during the active tax shelter years from any of the three preceding years. Further, in each of the years examined, the median leverage ratio of the tax shelter firms was below the leverage ratio of the matched control firms. This finding does not rule out off-balance-sheet financing as a possible contributing factor for entering into these tax shelters, but it suggests the identified tax shelter firms were not highly leveraged firms seeking to remove debt from their balance sheet.

Hanlon et al. (2007) use IRS operational audit and appeals data to examine tax noncompliance and find that multinational firms have greater deficiencies relative to non-multinational firms. This result is consistent with multinational firms having more opportunities to develop tax shelter strategies associated with their foreign activities. In a contemporaneous paper, Lisowsky (2008a) uses confidential tax shelter data obtained from the IRS and finds that tax shelter likelihood is positively related to the extent of foreign operations. As a result, I test for the association between the existence of foreign income ($FOREIGN_{it}$) and incidence of tax sheltering. In addition, Hanlon et al. (2007) predict that firms with greater intangible assets will have more opportunities for aggressive tax planning. Consistent with this argument, they find a positive association between a firm's intangible assets and the size of the firm's tax deficiency. Because only firms that use purchase accounting record intangible assets, I use the level of research and development scaled by total assets ($R\&D_{it}$) as an alternative proxy for intangibles to better reflect the level of a firm's self-created intangibles. I also include a measure of profitability (ROA_{it}) because I expect profitable firms to be more likely to be engaged in tax sheltering. ROA_{it} is measured as pre-tax income divided by total assets.

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[15] Dyreng et al. (2008) use a firm's cash effective tax rate (cash taxes paid over financial accounting income), calculated over periods ranging from one to ten years, as their measure of long-run tax avoidance.

IV. RESULTS

Table 4 reports the results of logistic regressions examining the determinants and characteristics of tax shelters using the matched pair control group. Table 4 presents both the estimated coefficients from the logistic regressions and the marginal changes ($\Delta Prob$) in the probability of using a tax shelter vehicle, implied by the estimated logit coefficients, which result from a unit change in the explanatory variables. The results of the full-sample analysis indicate that a 1 percent increase in BTDs leads to a statistically significant 2.78 percent increase in the probability the firm engages in tax sheltering. The results also indicate that tax sheltering is negatively associated with the level of a firm's debt holdings. However, I do not find a significant association between incidences of tax sheltering and ROA, the existence of foreign income, or the level of research and development expenditures. Not surprisingly, the coefficient on the *SIZE* variable is also not significant, which is consistent with the control firms being effectively matched to the tax shelter firms on the basis of size. Goodness-of-fit statistics are consistent with a good fit for this empirical model of tax sheltering, with correct prediction rates for the full sample model of 70 percent.

Column (2) of Table 4 substitutes both permanent BTDs (*PERM BTD*) and temporary BTDs (*TEMP BTD*) for the overall measure of BTDs from Column (1). Temporary BTDs are calculated as the federal deferred tax expense grossed up by the applicable statutory rate and scaled by beginning total assets. Permanent BTDs are calculated by subtracting the temporary component of BTDs from the total BTD measure. The results in Column (2) indicate both components of the BTD measure are positively and significantly associated with tax sheltering. This result is not surprising given the identified tax shelters lead to a mix of either permanent or temporary book tax differences. This finding suggests that both components of BTDs can capture elements of tax aggressiveness.

Column (3) of Table 4 adds a measure of earnings management, *DAP*, as an additional explanatory variable. The results indicate that a 1 percent increase in discretionary accruals leads to a statistically significant 3.45 percent increase in the probability the firm engages in tax sheltering. This result suggests aggressive accrual-based earnings management is positively associated with tax aggressiveness. The coefficient on the BTD variable remains positive and significant with the addition of the DAP variable to the regression in Column (3). This finding suggests a common association with accrual based earnings management does not drive the association between tax sheltering and BTDs.

The next column in Table 4 presents the regression results for the subsample of the tax shelter firms with identified tax savings data and the associated matched control firms. Consistent with the results for the broader sample of tax shelter firms, BTDs remain positively and significantly associated with incidences of tax sheltering. However, in Column (5) of Table 4 I replace the BTD variable for the tax shelter firms with the *ADJUSTED BTD* variable. The *ADJUSTED BTD* variable is the estimated book-tax difference modified to remove the effect of the tax shelter activity. As discussed previously, this adjustment leads to a significant reduction in the BTDs of the mean tax shelter firm. The results in Column (5) indicate the *ADJUSTED BTD* variable is still positively associated with tax shelter activity, but the association is no longer significant. This finding suggests the tax-sheltering activity itself is an important driver of the significant association between tax sheltering and BTDs and that removing the effects of tax sheltering limits the use of BTDs as a signal of tax sheltering.

Table 5 presents the results of a robustness check on the results reported in Table 4 using an expanded sample of control firms. Rather then limiting the control sample to one matched firm per tax shelter firm, I match firms on the basis of two-digit SIC code, year, and assets (return on assets) within +/− 25 percent (+/− 50 percent) of the sheltering firm's assets (return on assets). This procedure results in numerous matched control firms for each tax shelter firm observation. Not surprisingly, the most dramatic difference between Tables 4 and 5 relates to the *SIZE* variable. Because the control firms in Table 5 are not matched as closely to the tax shelter firms on the basis of size, the *SIZE* variable is positive and significant in each estimated regression in Table 5. This result is consistent with the tax shelter firms being very large firms relative to the other firms in their industries. In contrast to Table 4, the results in Table 5 also indicate that both ROA and the existence of foreign income are both positively and significantly associated with tax sheltering in each specification of the regression. The results in Column (2) of Table 5 indicate that only the temporary component of BTDs is significantly associated with tax sheltering using this broader sample of control firms. It is possible that because the existence of foreign income is associated with permanent BTDs the *FOREIGN* variable is subsuming some of the rate effect of permanent BTDs. The results for the other variables are generally consistent with those reported in Table 4.[16]

I also test the association between the incidence of tax sheltering and two additional proxies for tax aggressiveness. I separately added the long-run cash effective tax rate measure developed by Dyreng et al. (2008) and an estimate of changes in tax cushion developed by Blouin and Tuna (2007) into the model of tax shelter participation in place of BTDs to test their association with the incidence of tax sheltering. The results (not tabulated) do not indicate a significant association between these two alternative measures of tax aggressiveness and my sample of actual tax shelter cases. However, cash taxes paid, which is only available on the Compustat database beginning in 1988, is necessary to calculate both these measures, which leads to a significant reduction in the sample of test firms (n = 32) available to examine these alternative proxies. This reduction in sample size leads to a corresponding reduction in test power.

V. TAX SHELTERING AND MANAGERIAL OPPORTUNISM

This section examines whether tax sheltering is associated with wealth creation for shareholders or with managerial opportunism. The purpose of this section is to provide a preliminary empirical analysis of predictions based on the theoretical framework developed by Desai and Dharmapala (2006). This examination also provides an example of an application of the model of tax shelter participation developed in this study. Desai and Dharmapala (2006) note that a critical element of a tax shelter is to design a transaction so as to obscure its underlying purpose. Desai and Dharmapala (2006) examine the decision by managers to engage in tax sheltering within the principal agent framework and conjecture that desire by managers to engage in actions not in the interest of shareholders and desire to shield income from tax authorities could be complementary.

Hanlon and Slemrod (2006) test investors' perceptions of tax shelter participation by examining the stock market reaction to news of tax sheltering. They find that the average

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[16] Mills (1998, 350) limits her primary analysis to firms where book income exceeds taxable income, based on the assumption that BTDs "are most 'suspicious' when book income exceeds taxable income." I extend my analysis to examine whether it is only positive BTDs that are associated with tax-sheltering activity. In untabulated results, I find the association between BTDs and tax sheltering remains positive and significant for firms with positive BTDs. I find no significant association between the magnitude of negative BTDs and incidence of tax sheltering.

TABLE 5
Regression Examining Determinants and Characteristics of Tax Shelter Firms
Broader Control Sample

	Pred. Sign	Full Sample			Full Sample			Full Sample			Tax Savings Sample			Tax Savings Sample		
		Coeff	ΔProb	t-stat	Coeff	ΔProb	t-stat	Coeff	ΔProb	t-stat	Coeff	ΔProb	t-stat	Coeff	ΔProb	t-stat
Intercept	?	−4.30	−1.08	4.09***	−3.37	−0.84	3.26***	−4.86	−1.22	4.38***	−4.29	−1.07	2.99***	−4.00	−1.00	2.85***
BTD	+	6.63	1.66	2.02**				5.20	1.30	1.54*	8.49	2.12	1.53*			
PERM BTD	+				0.49	0.12	0.11									
TEMP BTD	+				15.24	3.81	2.77***									
ADJUSTED BTD	+													−0.47	−0.12	0.09
DAP	+							4.08	1.02	1.63*						
LEV	−	−1.72	−0.43	1.39*	−2.13	−0.53	1.65**	−1.41	−0.35	1.18	−0.76	−0.19	0.46	−0.63	−0.16	0.38
SIZE	?	0.66	0.16	2.77***	0.49	0.12	2.09**	0.76	0.19	3.05***	0.51	0.13	1.51*	0.44	0.11	1.34*
ROA	+	2.26	0.57	1.31*	−0.65	−0.16	0.40	3.51	0.88	1.75**	4.59	1.15	1.63*	5.79	1.45	2.23**
FOREIGN INCOME	+	1.62	0.41	4.17***	1.51	0.38	3.43***	1.72	0.43	4.35***	1.28	0.32	2.58***	1.09	0.27	2.20**
R&D	+	1.56	0.39	0.39	7.75	1.94	1.77**	2.43	0.61	0.58	5.24	1.31	1.05	5.69	1.42	1.12
Observations			319			319			319			166			166	
Goodness of Fit Statistics																
Pseudo R^2			0.12			0.12			0.13			0.15			0.14	
Chi-Square Test			40.87			39.94			45.63			27.17			24.63	
% Correct			0.78			0.76			0.79			0.80			0.80	

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*, **, *** Indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively (one-tailed tests). The t-statistics are for the logit coefficients.

The regressions in columns (1) through (3) contain 59 tax shelter observations and the regressions in columns (4) and (5) contain 33 tax shelter observations. The control sample is composed of firms with the same two-digit SIC code, year, and assets (return on assets) within +/− 25 percent (+/− 50 percent) of the sheltering firm's assets (return on assets).

Logit regression estimates of the relation between the likelihood that a firm engages in tax sheltering and proxies for firm characteristics hypothesized to be associated with tax sheltering. The dependent variable, *SHELTER*, is an indicator variable set equal to 1 for firm-year observations where the firm is identified as having an active tax shelter, and set to 0 for all other firm-year observations. *FOREIGN INCOME* is an indicator variable set equal to 1 for firm observations reporting foreign income, and set to 0 for all other observations. *ADJUSTED BTD* is an estimate of the book-tax difference the firm would have reported had management not recorded the tax benefit associated with the identified tax shelter. All other variables are calculated as reported in Table 2. All variables are calculated as the average value of the variable reported by the firm during the active tax shelter years. ΔProb measures the marginal change in the probability of using a tax shelter resulting from a change in the independent variable.

company's stock price declines when there is news about its involvement in a tax shelter. Hanlon and Slemrod (2006) acknowledge that in general this finding is not surprising given that news about expected tax-shelter-related penalties will almost certainly be viewed as negative. However, they do find some interesting cross-sectional variation in their results and note the stock price decline associated with news about sheltering is much smaller than for accounting-related misdeeds such as SEC accusations of violating Generally Accepted Accounting Principles (GAAP). Hanlon and Slemrod (2006) propose an additional explanation for the negative reaction to tax-sheltering news: shareholders' belief that if management is willing to cheat the IRS, then it might also be willing to cheat them. Consistent with this argument, they find a smaller stock price decline for firms with strong corporate governance. For these firms, news about tax shelter participation is less likely to cause shareholder concern about management opportunism. Further, they find the market favorably receives news about tax shelter involvement for well-governed firms with especially high effective tax rates. They contend investors respond favorably when *ex ante* public information makes it less likely they will perceive the firm as tax aggressive. This finding is consistent with investors viewing aggressive tax reporting positively for well-governed firms.

I extend this analysis by examining the stock return performance of tax shelter firms during the period they actively engaged in tax sheltering, as well as the 24-month period prior to the initial year of tax sheltering, and the 24-month period following the final year of sheltering. Evidence of value destruction in tax shelter firms with poor corporate governance during the period of active tax shelter participation would be consistent with the contention that managers of poorly governed firms use tax shelters to engage in diversionary activities. In contrast, if corporate governance mitigates against the diversionary use of tax shelters, then I would expect tax shelter firms with strong-governance characteristics to outperform those with poor-governance.

I use the Gompers et al. (2003) index of shareholder rights as a measure of corporate governance characteristics. This measure is based on 24 different provisions, which can be classified into five categories: tactics for delaying hostile bidders, voting rights, director and officer protection, other takeover defenses, and state laws. Each of these categories represents potential determinants of a firm's takeover vulnerability. The Gompers et al. (2003) index ranges from 0–24, where low scores indicate a lower degree of insulation for managers from hostile takeovers and therefore a higher quality of corporate governance. I expect that more insulated managers from poorly governed firms will be better able to use tax shelters in an opportunistic manner.[17] Gompers et al. (2003) construct values of G for a large sample of firms for various years beginning in 1990. As a result, I limit my analysis to tax shelter and control firm observations with fiscal years beginning in 1990. I include a matched set of control firms in these regressions in order to alleviate the concern that differences in performance between the well-governed and poorly governed tax shelter firms simply result from differences in governance quality. Control firms are matched to the tax shelter firms on the basis of fiscal year and two-digit SIC code. Within the same industry, the matched firms are those with assets (return on assets) within +/− 25 percent (+/− 50 percent) of the tax shelter firm's assets (return on assets).[18]

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[17] Gompers et al. (2003) provide results consistent with their G variable being correlated with factors such as firm size, institutional ownership, and past sales growth. Differing effects for well-governed and poorly governed control firms could be a result of these factors and not their governance characteristics. However, that I observe no difference in the performance of the well-governed versus poorly governed control firms helps to mitigate this concern.

The indicator variable *POOR GOVERNANCE-CONTROL* is set equal to 1 for control firms with a corporate governance score above the sample median, and set to 0 for all other observations. The indicator variable *GOOD GOVERNANCE-CONTROL* is set equal to 1 for control firms with corporate governance scores equal to or below the sample median, and to 0 for all other observations. I do not expect a significant difference between the returns of the well-governed and the poorly governed control firms. In other words, governance quality alone should not drive abnormal returns but rather the combination of poor-governance and active tax shelter participation.

The indicator variable *POOR GOVERNANCE-SHELTER* is set to 1 for tax shelter firms with governance scores above the median score in my sample, and all other observations are set to 0. The regressions are conducted using monthly stock return data for the tax shelter firms. The monthly data for each of the Fama-French factors were drawn from Ken French's website. The abnormal returns for the tax shelter firms with strong-governance are reflected in the intercept of the Fama-French regressions. Including the dummy variables in the Fama-French regressions allows me to interpret the coefficient on those variables as the abnormal monthly return attributable to those sets of firms incremental to the abnormal return for the well-governed tax shelter firms. If the combination of good-governance and tax sheltering is associated with wealth creation for shareholders, then I expect the coefficient on the *POOR GOVERNANCE-SHELTER* indicator variable will be negative and significant, indicating returns for the poor-governance firms are significantly lower than those for the good-governance firms. I also interact the factor loadings with each of the indicator variables to allow the risk loadings to vary by group membership. The coefficients for these interaction variables are not tabulated. Not all of the tax shelter firms have complete monthly stock return data for the periods examined.

Stock Return Performance of Identified Tax Shelter Firms

In interpreting the results of the stock return performance tests, I assume investors are aware the tax shelter firms are aggressive corporate taxpayers. This assumption does not necessarily imply investors are aware of the particulars of a firm's tax sheltering arrangement, or that news of a firm's tax shelter involvement does not convey some new information about the extent of its tax reporting aggressiveness or potential penalties associated with the sheltering. However, I do assume that investors are aware the tax shelter firms engage in aggressive corporate tax-reporting schemes and incorporate this information into their valuation of the firm. Given difficulty in discerning when investors become aware of plans to engage in aggressive corporate tax reporting, I examine the 24-month periods surrounding the tax-sheltering activity as well as the period when the firm actively engaged in sheltering.

Table 6 reports the stock return performance of the tax shelter firms and the matched control firms. The intercept term representing the abnormal stock return of the well-governed tax shelter firms is positive and significant in each of the three periods examined. This result is consistent with tax sheltering creating wealth in firms with strong corporate governance. In contrast, the *POOR GOVERNANCE-SHELTER* variable is negative and significant during the period of active tax shelter participation and the 24 months following. This result indicates the tax shelter firms with poor governance provided significantly lower

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[18] In untabulated regressions I find the results are generally unchanged when a single size- and industry-matched set of control firms is used rather than the broader set of control firms described above.

TABLE 6

Fama-French (1993) Abnormal Return Regressions for the Periods Both Before, During, and After Tax Shelter Participation

	24 Months Prior to First Shelter Year	Active Shelter Years	24 Months After Final Shelter Year
Intercept	1.124	2.32	1.738
	(2.12)**	(2.47)***	(3.09)***
POOR GOVERNANCE-SHELTER	−1.256	−2.09	−2.313
	(−1.75)**	(−1.80)**	(−2.83)***
POOR GOVERNANCE-CONTROL	−1.415	−2.40	−1.562
	(−2.46)***	(−2.37)***	(−2.50)**
GOOD GOVERNANCE-CONTROL	−0.881	−2.00	−1.485
	(−1.38)*	(−1.75)**	(−2.03)***
MKTRF	1.021	1.10	0.970
	(14.50)***	(9.35)***	(11.91)***
SMB	−0.400	−0.55	−0.612
	(−4.19)***	(−3.60)***	(−6.76)**
HML	−0.166	−0.02	−0.038
	(−1.53)*	(−0.13)	(−0.33)***
UMD	−0.328	−1.65	−1.628
	(−0.30)	(−0.94)	(−1.45)*
Adjusted R^2	23.37%	27.11%	24.63%
Total Firm-Year Observations	793	395	755

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*, **, *** Indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively (one-tailed tests). Values in parenthesis represent t-statistics. F-tests (not tabulated) indicate that there is not a significant difference in the abnormal returns reported by *the POOR GOVERNANCE-SHELTER* firms, the *POOR GOVERNANCE-CONTROL* firms, or the *GOOD GOVERANCE-CONTROL* firms in any of the periods examined. Control firms are matched to the tax shelter firms on the basis of fiscal year and two-digit SIC code. Within the same industry, the matched firms are those with assets (return on assets) within +/− 25 percent (+/− 50 percent) of the tax shelter firm's assets (return on assets).

Regression of monthly returns (less the risk free rate) on the four factor Fama-French (1993) model. *POOR GOVERNANCE-SHELTER* is an indicator variable set equal to 1 for tax shelter firms with governance scores above the sample median. *POOR GOVERNANCE-CONTROL* is an indicator variable set equal to 1 for matched control firms with governance scores above the sample median. *GOOD GOVERNANCE-CONTROL* is an indicator variable set equal to 1 for matched control firms with governance scores equal to or below the sample median. The governance score is a continuous governance variable from Gompers et al. (2003). All other variables are as defined in Fama and French (1993). The factor loadings are interacted with each of the indicator variables to allow the risk loadings to vary by group membership. The coefficients for these interaction variables are not tabulated.

abnormal returns than the strong governance ones. The coefficients on both the *POOR GOVERNANCE-CONTROL* and *GOOD GOVERNANCE-CONTROL* variables are also negative and significant during the period of active tax shelter participation and the 24 months following, indicating that each of the sets of control firms significantly underperformed the well-governed tax shelter firms. An F-test indicated there was not a significant difference in performance between the well-governed and poorly governed control firms in any of the periods examined. This finding is consistent with my conjecture that the quality of corporate governance alone will not drive a difference in abnormal returns, but rather that it is the interaction of corporate governance characteristics and active tax shelter participation, which leads to a difference in abnormal returns.

Note that only the well-governed tax shelter firms exhibit significant abnormal returns during any of the periods examined. While the tax shelter firms with poor-governance underperformed those with strong-governance, they did not exhibit negative abnormal returns. In general, the results are consistent with the assertion that tax sheltering is a wealth-creating activity for shareholders, but that this benefit is mitigated for firms with poor corporate governance. However, while these results are consistent with tax sheltering being associated with wealth creation in well-governed firms, it is impossible to determine whether the actual act of tax sheltering causes those positive abnormal returns. It is possible that tax sheltering is simply associated with other management actions that produce positive abnormal returns.[19,20]

Stock Return Performance of Predicted Tax Shelter Firms

In order to examine the association between tax sheltering and managerial opportunism over a broader set of firms, I use the model of tax shelter firm characteristics to predict which firms are likely currently engaged in tax sheltering. I then examine the stock return performance of these predicted tax shelter firms using an approach consistent with the analysis described above for the identified tax shelter firms. The purpose of this analysis is to provide a robustness check for the tests examining the stock return performance of the identified tax shelter firms, and to demonstrate the usefulness of a model that can identify firms currently engaged in tax sheltering.

I use the model from Column (3) of Table 5 to predict which firms currently engage in tax sheltering. This model includes the absolute value of discretionary accruals as a determinant of tax sheltering and was estimated on 59 tax shelter observations and 260 matched control firm observations. Predicted values are obtained by inserting each firm's characteristics into the model and using the estimated coefficients to determine a predicted value. The predicted probability of tax sheltering is calculated as follows:

$$P(Sheltering) = \frac{e^{(PredictedValue)}}{(1 + e^{(PredictedValue)})}.$$

The hold-out sample comprises all firm-year observations not used in the first-stage estimation along with the necessary data available to calculate each of the hypothesized tax shelter firm characteristics used in the model. In addition, I limit the hold-out sample to firm-year observations occurring after 1990 with available Gompers et al. (2003) governance data. Next, I rank the hold-out sample firm-year observations into quintiles based

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[19] To avoid some of the difficulties associated with long-window stock return tests and the assumptions regarding when investors incorporate information about firm's tax reporting behavior, I also examine the operating performance of the actual tax shelter firms and matched control firms during the period of active tax sheltering. The results (not tabulated) indicate that the mean after-tax earnings of the tax shelter firms are significantly greater than those of the matched control firms. Also consistent with the stock return performance tests, the well-governed tax shelter firms report the strongest operating results of any of the subsamples examined.

[20] In an effort to determine whether the abnormal returns are reasonable in light of the tax savings generated by the tax-sheltering activity, I calculated the abnormal returns (not tabulated) for the subset of tax shelter firms with good governance and available tax savings data. I calculated mean one-year abnormal return performance of 5.8 percent. This level of abnormal returns would have increased the market value of this subset of tax shelter firms by an average of $212.8 million. This figure compares with an average annual federal tax savings generated by the tax shelters of $76.5 million for this subset of well-governed tax shelter firms. This result suggests that while the tax shelter savings might contribute to the abnormal returns it is unlikely to be the sole cause of strong performance for these firms.

on the probability the firm currently engages in tax sheltering. Firm-year observations ranked in the top quintile are then designated as predicted tax shelter firms.

Table 7 reports the stock return performance of the predicted tax shelter firms and associated control firms. Consistent with the tests examining the stock return performance of the identified tax shelter firms, the predicted tax shelter firms with strong governance significantly outperform both the poorly governed predicted tax shelter firms and the well-governed and poorly governed control firms. This result further supports the conjecture that the combination of strong governance and active tax shelter participation is associated with wealth creation for shareholders.[21]

VI. CONCLUSION

Using a set of firms identified in Tax Court records and press articles as having participated in corporate tax shelters I develop a profile of the type of firm likely engaged in tax sheltering. The profile suggests in the majority of cases that tax-sheltering activity significantly increases a firm's BTDs. The identified tax shelter firms exhibit significantly higher BTDs than two alternative sets of matched control firms. These findings suggest investors and researchers can use large positive BTDs as a signal of tax aggressiveness. Adjustment of the BTDs of the tax shelter firms to remove the effects of the tax shelter activity results in the shelter firms no longer exhibiting significantly higher BTDs than the matched control firms. This finding supports previous research attributing the growth in BTDs during the 1990s to increased tax sheltering. I also find that tax sheltering is positively associated with firm size, the existence of foreign income, and aggressive financial reporting

This study also provides insight into whether aggressive tax-reporting strategies are beneficial or harmful to investors. The results indicate that tax shelter firms with strong corporate governance exhibit significant positive abnormal returns during the period of active tax shelter participation. These results are consistent with tax sheltering being associated with wealth creation for shareholders in firms with strong corporate governance. Additional analyses examining the performance of a broader set of firms predicted to be engaged in tax sheltering (based on the model of tax shelter participation developed in the first part of this study) also support these results. While it is possible that tax sheltering itself is the source of the wealth creation, it is also possible the combination of good governance and active tax sheltering is simply a sign of strong incentive alignment between managers and shareholders that leads to superior performance.

There are several limitations to this study. I examine a set of tax shelter firms successfully identified and investigated by the IRS. While the use of tax shelters may be pervasive, this set could represent a unique subset of tax shelter participants. As a result, the findings from this study may not generalize to a broader set of tax shelter participants. In addition, subsequent legislation and IRS investigation have curtailed many of the specific types of tax shelters in which these firms participated. Consequently, these findings might not generalize to newer forms of tax sheltering employed by firms currently or in the future.

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[21] In untabulated tests I replicated the regressions reported in Tables 6 and 7 using the percentage of 5 percent blockholder ownership of the firm obtained from Compact Disclosure as an alternative measure of corporate governance. In replicating the tests from Table 6 using the actual tax shelter firms, I did not find significant differences in the abnormal returns of any of the groups of firms. However, because the blockholder data are only available for the years from 1996–2001, I was only able to match 22 of the tax shelter firm year observations to this data, which significantly reduced the sample size and therefore the power of this test. For the predicted tax shelter tests, which have a larger sample, the tests using this alternative proxy for corporate governance were generally consistent with those reported in Table 7.

TABLE 7
Fama-French (1993) Abnormal Return Regressions for Predicted Tax Shelter and Control Firms

	Predicted Active Shelter Years
Intercept	0.451 (5.87)***
POOR GOVERNANCE-SHELTER	−0.504 (−6.43)***
POOR GOVERNANCE-CONTROL	−0.764 (−10.40)***
GOOD GOVERNANCE-CONTROL	−0.455 (−6.32)***
MKTRF	1.232 (75.66)***
SMB	0.482 (22.14)***
HML	0.193 (7.94)***
UMD	2.277 (14.21)***
Adjusted R^2	11.43%
Total Firm-Year Observations	32,676

*, **, *** Indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively (one-tailed tests). Values in parenthesis represent t-statistic

Regression of monthly returns (less the risk free rate) on the four-factor Fama-French (1993) model. *POOR GOVERNANCE-SHELTER* is an indicator variable set equal to 1 for predicted tax shelter firms with governance scores above the sample median. *POOR GOVERNANCE-CONTROL* is an indicator variable set equal to 1 for predicted non-tax shelter firms with governance scores above the sample median. *GOOD GOVERNANCE-CONTROL* is an indicator variable set equal to 1 for predicted non-tax-shelter control firms with governance scores equal to or below the sample median. I use the model from Column (3) of Table 5 to predict which firms are currently engaged in tax sheltering. Predicted values are obtained by plugging in each hold-out firm's characteristics into the model and using the estimated coefficients to determine a predicted value. The hold-out sample is composed of all firm-year observations not used in the first-stage estimation with the necessary data available to calculate each of the hypothesized tax shelter firm characteristics used in the model. The hold-out sample firm-year observations are then ranked into quintiles based on the probability the firm is currently engaged in tax sheltering. Firm-year observations ranked in the top quintile are then designated as predicted tax shelter firms. The governance score is a continuous governance variable from Gompers et al. (2003). All other variables are as defined in Fama and French (1993). The factor loadings are interacted with each of the indicator variables to allow the risk loadings to vary by group membership. The coefficients for these interaction variables are not tabulated. See text for a complete discussion of how the predicted tax shelter firms are identified.

While this study provides insight into both the signals of tax shelter activity and the implications of that activity for investors, many important questions about tax sheltering remain. Despite the sizeable savings generated by tax shelters there is significant cross-sectional variation in the extent firms engage in such activity. Recent studies by Lisowsky (2008a) and Brown (2008) illuminate why this variation exists. Brown (2008) models a firm's decision to adopt the COLI tax shelter and finds firms with greater capital market visibility are less likely to adopt one. She finds no evidence of common auditors or imitation of prior COLI adopters explaining the spread of this tax shelter. Using confidential tax shelter data obtained from the IRS, Lisowsky (2008a) finds the likelihood of a firm engaging in tax sheltering is positively associated with the number of subsidiaries located in tax havens, financial complexity, litigation losses, and the use of tax shelter promoters. Studies such as these examining the determinants of tax sheltering have the potential to make an important contribution to our understanding of cross-sectional variation in tax-reporting practices among firms.

APPENDIX
TAX SHELTER DESCRIPTIONS

Lease-In, Lease-Out (LILO)

In a LILO transaction a U.S. corporation leases long-lived property, such as a building, from a tax-indifferent party (e.g., a municipality) and then immediately subleases the property back to the same party. The lease calls for the U.S. corporation to prepay its rental obligation, which generates a significant deduction for tax purposes in the early years of the lease. For financial reporting purposes, the U.S. corporation is able to amortize the costs over the life of the lease. The early tax deduction is offset by income recognized by the U.S. corporation in the final year of the lease. However, the U.S. corporation can use the early net deduction to offset other unrelated income, and it provides a significant time-value benefit.

There were a total of four LILO transactions examined in this study. Graham and Tucker (2006) note these shelters were popular from 1995 to 1999. Because the cost of the lease is amortized over a much longer period for financial reporting purposes than for tax purposes, LILO shelters should generate a significant temporary book-tax difference. This difference would result in a deferred tax liability in the early years of the lease, but would not reduce the firm's effective tax rate.

Corporate-Owned Life Insurance (COLI)

In a basic COLI transaction, the corporation purchases numerous cash value life insurance policies on the lives of its employees. The corporation will then borrow funds to pay the premiums on the policies. The anticipated buildup inside the policy is substantially offset by the interest expense from the borrowing, so there is little net nontax benefit associated with the policy. However, for tax purposes, while the inside-buildup on the cash-value life insurance is not included in income, the interest on the debt used to fund the policy is deductible. This mismatch creates a significant tax benefit for the corporation.

The investment return inside a COLI policy would result in a permanent book-tax difference that would lead to a reduced effective tax rate, which would occur regardless of whether the firm borrowed to pay the premiums on the policy. There are a total of 12 COLI tax shelters examined in this study.

Contested Liability Acceleration Strategy (CLAS)

Developed by KPMG, the CLAS tax shelter generated $1.7 billion in tax savings for several dozen companies, according to the *Wall Street Journal* (2004). KPMG devised the CLAS shelter to help clients accelerate the timing of tax deductions for settlements of lawsuits and other claims against the corporation. Typically, deductions for these claims are not allowable until the claim is paid. However, one exception to this rule involves transferring money or other property to a contested liability trust before the claims are resolved. A firm would establish a trust with itself as the beneficiary, and then transfer noncash assets such as company stock or some type of intercompany note to the trust. The transferred items were intended to correspond to amounts owed related to a particular claim, and the firm would then take a deduction when the items were transferred to the trust. The CLAS shelter likely results in a timing difference between book and tax reporting, but the nature of this difference is dependent on when the deduction is taken for financial reporting purposes. There are seven CLAS shelters, all from the year 2000, included in the sample of tax shelter firms.

Contingent-Payment Installment Sales (CPIS)

The purpose of the CPIS shelter is to generate a paper capital loss to offset a real capital gain generated by the corporation. A typical CPIS transaction would involve a U.S. corporation forming a partnership with a tax-exempt foreign entity. In the beginning the foreign partner would have the overwhelming majority partnership interest. The partnership would then purchase short-term private placement notes eligible for the installment method of accounting and sell the notes for a large cash down payment with the balance made up of a comparatively small number of debt instruments. The gain from the sale would be allocated according to partnership interests, with the foreign entity receiving the majority of the gain. The partnership would then claim a large basis in the remaining debt instruments. At the end of the tax-year, the partnership interests would be reversed and the partnership would distribute the cash to the foreign entity and the notes to the U.S. company in redemption of its partnership interests. The U.S. company would then sell the notes to a third party, and because the basis in the notes greatly exceeds their value, the sale would create a large paper loss that could be used to offset existing capital gains. This type of shelter would lead to a permanent reduction in a firm's effective tax rate. There are seven CPIS shelters in the tax shelter sample.

Cross-Border Dividend Capture (CBDC)

Under this tax shelter a corporation purchases foreign stock immediately prior to the record date after a dividend has been declared and then sells the stock ex-dividend immediately after the record date, capturing the dividend and the foreign withholding tax credit. The corporation realizes a short-term capital loss on the sale because of the price decline associated with payment of the dividend, which offsets the dividend received by the corporation. This transaction allows the U.S. firm to capture the foreign tax credit to offset U.S. income tax liability, as foreign shareholders have no use for the credits with no U.S. income tax to offset. This type of shelter would lead to a permanent reduction in a firm's effective tax rate through the use of increased foreign tax credits. There were two CBDC shelters in the Graham and Tucker (2006) sample.

Transfer Pricing

This type of shelter occurs when a U.S. corporation with a foreign subsidiary in a low-tax jurisdiction produces an asset at the foreign subsidiary and then has the subsidiary sell the asset back to the U.S. corporation at an above-market price. Selling the asset to the U.S. parent at an above-market price enables the company to subject most of the profit on the asset to the low foreign tax rate. To the extent the company chooses to designate profits earned in the foreign subsidiary as permanently reinvested, a transfer pricing shelter results in a reduction in its effective tax rate. There are 16 transfer pricing shelters in the Graham and Tucker (2006) sample.

Offshore Intellectual Property Havens (OIPH)

In this type of shelter a U.S. multinational corporation establishes a subsidiary in a low-tax foreign jurisdiction, such as Bermuda, and buys a portion of valuable intellectual property from the U.S. parent, such as trademarks and patents. The offshore subsidiary will then collect the royalties from sales of the parent company's products overseas. The IRS requires royalties be reported, but payments made back to the U.S. are subject to discretion and often set artificially low, limiting the extent to which royalties are subject to U.S. taxation. The firm can then use the remaining untaxed profits to expand operations overseas. Similar to the transfer pricing shelter, the OIPH shelter will result in a reduction in the participating firm's effective tax rate. There are two OIPH shelters included in the sample.

401(k) Deduction Acceleration Strategy

Similar to CLAS, 401(k) Accel was developed by KPMG during the late 1990s. On October 14, 2005, the *Wall Street Journal* reported that KPMG sold the 401(k) Accel to at least 143 companies, which together "claimed undisclosed millions in accelerated tax deductions." The 401(k) Accel strategy requires a company's tax year to end on a different day from its 401(k) plan's fiscal year, which would be changed if necessary. The firm's board would then pass a resolution on or before the last day of the tax year—but at the start of the 401(k) plan's new fiscal year—fixing the company's minimum 401(k) contribution for the coming year. The firm would then record a tax deduction comprised both the prior year's contribution and a large portion of the next year's contribution. The 401(k) Accel strategy would likely result in a timing difference between book and taxable income. There were a total of two 401(k) Accel tax shelters examined in this study.

Other

There were seven tax shelters that only appeared in the sample one time, categorized as "other" tax shelters. This set of shelter observations includes interest rate swaps, money market principal strips, and sham transactions.

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BOOK REVIEWS

Stephen A. Zeff, Editor

Editor's note: Two copies of books for review should be sent to the Book Review Editor: Stephen A. Zeff, Rice University, Jesse H. Jones Graduate School of Management, 6100 Main St., Houston, TX 77005. The policy of *The Accounting Review* is to publish only those reviews solicited by the Book Review Editor. Unsolicited reviews will not be accepted.

MARC J. EPSTEIN, *Making Sustainability Work: Best Practices in Managing and Measuring Corporate Social, Environmental, and Economic Impacts* (Sheffield, U.K.: Greenleaf Publishing, 2008, ISBN 978-1-57675-486-3, pp. 288).

This book is primarily a *how to* guide for corporate managers concerned with implementing so-called "corporate social responsibility"/"sustainability" programs.[1] It aims to enable the "execution of [sustainability] in complex business organizations" (p. 249) and "transcend[s]" (p. 14) debates about *why* or *whether* organizations should tackle their corporate social and environmental impacts. The author promotes a distinctly positive, proactive approach to implementing "sustainability," which embraces innovation and opportunity as well as risk and compliance. The text is written in a clear, accessible manner and draws on the author's extensive experience advising and researching on issues surrounding the corporate implementation of sustainability for both academic and consulting assignments, as well as an array of empirical work and best-practice exemplars. The central organizing feature of the book is *The Corporate Sustainability Model* which claims to describe "the inputs, processes, outputs, and outcomes necessary to implement a successful sustainability strategy" (p. 25). A further feature of the text is the extensive use of "real-world" examples from well-known corporations.

The introductory chapter reiterates that how, not whether, to integrate corporate social, environmental, and economic impacts—termed "corporate sustainability"—into management decision making is a core issue for corporate managers. Regulations, communities, cost and revenue opportunities, and social and moral obligations are seen to conflate to make implementing substantive sustainability strategies an urgent and key managerial challenge. Managers are cautioned against engaging in a mere "public relations strategy to pacify stakeholder concerns ... as stakeholders expect action and results to be consistent with rhetoric" (p. 21). Moreover, implementing a sustainability strategy is seen as a dynamic, albeit often ambiguous process, especially when trade-offs between profit and environmental or social performance are considered. After claiming that standard implementation approaches are doomed to failure, the author introduces *The Corporate Sustainability Model* as a framework allowing managers to identify, measure, and integrate social and environmental impacts into corporate strategy and management decisions in order to reduce negative impacts and increase profitability. This ambitious, all-encompassing suite of aims for the model sets up the remainder of the text, thereby guiding readers through the diverse issues addressed in the remaining nine chapters.

Chapter 1 develops the book's framework revolving around the aforementioned *Corporate Sustainability Model*. The model is designed to allow customization to suit particular industries, geographical, and internal or external business contexts. Its elucidation is aided by the author's clear outline of what he sees as the nine central principles of sustainability encompassing areas such as ethics, governance, employment practices, and environmental protection. A key feature of these principles, and one of the greatest challenges for managers, is that they should be capable of being quantified or monetized. Central commitments to stakeholder identification and accountability also underpin the model's implementation. Given the book's primary managerial audience, the potential synergy between so-called sustainability performance and financial performance is consistently highlighted.

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[1] *Corporate sustainability* is defined by the author as "corporate social, environmental and economic impacts" (p. 19).

Chapter 2 outlines the importance of leadership in "kick-starting" the model's implementation. It emphasizes the need for explicit board and CEO commitment to sustainability and advises on how to develop a corporate sustainability strategy influenced directly by the company's mission statement. Current relevant standards and codes of conduct such as the UN Global Compact and ISO 14000 are introduced, and an intriguing passage on managing government relations advises companies to be proactive in order to pre-empt potential regulatory controls. The chapter concludes by declaring that, while important, the "tone at the top is critical but not sufficient on its own" (p. 84), as detailed integration of sustainability strategies is required throughout the organization. Chapter 3 tackles this integration theme in the context of corporate structure. Decisions over whether to use centralized or decentralized structures when implementing sustainability strategies are reviewed, using examples from McDonald's and Hennes & Mauritz. The importance of the total integration of strategy throughout the organization is reiterated, and emphasis is placed on the need for senior sustainability officers to have direct access to the CEO. The final substantive section examines philanthropy and collaborations with NGOs. Using examples from The Home Depot, Starbucks, McDonald's, and Novartis Argentina, it recommends strategies required to make these collaborations work for both parties. While this discussion is convincing in places, it would have been interesting to obtain more detail on how more antagonistic NGOs' concerns can be addressed, if at all.

The various management systems central to successfully implementing the established sustainability strategy are addressed in Chapter 4. Capital investment decision processes encompassing social and environmental costs and benefits are considered. The difficulties involved in establishing the costs and benefits of developing sustainability programs are summarized, and various costing systems designed to identify the impact of the costs of activities, processes, and products and services are reviewed. The necessity of formally evaluating the social and political risks of capital investment decisions is emphasized, and a basic risk management process drawing on some of the author's prior work illustrates how to implement a framework designed to capture these risks. The chapter concludes with a discussion of the distinction between, and importance of, considering real and perceived risks.

The author constantly reminds readers of the claimed causal relationship between sustainability performance and financial performance underpinning *The Corporate Sustainability Model.* Achieving this financial payoff is seen to depend on the design of managerial performance evaluation and reward systems aimed at aligning managers' incentives with improved sustainability performance. Chapter 5 confronts this issue by focusing primarily but not exclusively on quantitative performance measures. In the area of incentives and rewards, internal waste taxes and emissions trading programs are reviewed. The balanced scorecard—adapted to explicitly consider social and environmental impacts—and shareholder value analysis are subsequently presented as two additional approaches that can assist managers in organizing, identifying, measuring, and reporting on sustainability performance.

A central requirement of managers attempting to implement *The Corporate Sustainability Model* is their ability to measure social, environmental, and economic impacts. Chapters 6 and 7 confront this issue. Chapter 6 lays the conceptual foundations for measurement, while Chapter 7 aims to discuss the practical application of these foundations. Chapter 6 is initially impressive, as it attempts to unpick the concept of "value" in the context of social and environmental impacts. It is argued that, in order to understand how stakeholders place value on social and environmental assets, market and non-market impacts need to be measured. The total value of a resource is considered to be the sum of its *use value, option value,* and *existence value.* It is suggested that managers may measure social and environmental impacts based on individuals' willingness to pay (WTP) for a resource or their willingness to accept (WTA) compensation in exchange for a resource. A number of techniques designed to collect data on WTP and WTA, such as damage costing, hedonic pricing, and the travel cost method, are outlined and summarized neatly in Table 6.1 (p. 149). The chapter subsequently returns to the some of the risk-related issues considered in Chapter 4. Methods for measuring social and environmental risks, including scenario-based methods, fuzzy logic, and Monte Carlo simulation, are discussed. Chapter 7 proceeds to provide guidance on how some of these methods can be executed and will likely be the chapter most referred to by corporate managers. It reintroduces *The Corporate Sustainability Model* and suggests various ways of measuring the inputs, processes, outputs, and outcomes central to the model. For example, 40 performance measures are offered to assess sustainability performance (see p. 172), including the number of plant closures, the number of customer returns, cost of community support, percentage of recyclable products/process materials, and volume of emissions to air and water. Several stakeholder engagement mechanisms and reputational and social and political risk measures are also introduced. While the imprecision of many of the measurements recommended is recognized, the author's measurement mantra prevails, and he insists that multiple measures must be included in ROI calculations and managerial decision making at all levels. The chapter concludes with some examples of survey-based work aimed at measuring social and environmental impacts which focus on enacting some of the methods/concepts outlined in Chapter 6. I felt that this section would have benefited from greater expansion and more direct links back to the concepts/methods of Chapter 6, as the synergy between Chapters 6 and 7 seemed somewhat lacking. More examples of how to apply some of these methods would have helped better inform readers, while more extensive examples of company usage of the methods and the problems associated with their usage could also have been considered.

Chapter 8 takes up the theme of organizational learning and highlights its centrality to continually improving sustainability performance. The importance of developing systems and processes to support learning is emphasized, and life cycle assessment is presented as a framework for identifying where sustainability performance can be improved. Examples from Sony, Bristol-Myers Squibb, and Baxter International are provided to illustrate applications of the concept in different organizational contexts. Using so-called double loop learning, it is argued that social and environmental impacts can be reduced through product redesign, process re-engineering, and rethinking markets. Continual internal feedback, particularly within supply chain relationships, is deemed crucial to continuous improvement. The chapter reiterates the need for persistent proactivity on the part of companies addressing their social and environmental impacts.

Chapter 9 shifts the focus toward external communication and credibility, and outlines the importance of companies letting the outside world know what they are doing with respect to their social and environmental impacts. The Global Reporting Initiative (GRI) framework for external reporting is briefly reviewed, and some examples of external reporting from Adidas-Salomon, Unilever, and Baxter are provided. The benefits of internal and external audits are subsequently considered in the context of increased stakeholder demand for the verification of corporate attempts to address sustainability issues. This chapter is a little broad and could have done with exploring in more depth some of the disadvantages of external reporting and the low uptake of external verification among U.S. companies in particular.

Chapter 10 merges the main messages in the book, reiterating the claimed "cause-and-effect relationship between managerial actions and improvements in sustainability and financial performance" (p. 250). Several "documented" payoffs of improved sustainability performance are outlined, encompassing financial, customer-related, operational, and organizational payoffs. We are reminded of the key steps in sustainability strategy implementation and the scope for innovation (termed "corporate social *opportunity* (CSO)" [p. 257]) when dealing with improving sustainability performance.

The accessible, often stimulating, style, and the straightforward *Corporate Sustainability Model* allow readers to easily dip in and out of the text when addressing different ways of considering corporate social and environmental impacts. While the book does not shirk from the difficult decisions managers have to make in reconciling what can often be the irreconcilable notions of profit and corporate social and environmental responsibility, it could, however, have provided greater evidence, particularly of a financial nature, supporting the possible synergies as well as more critical reflection on the potential for conflict between financial and social/environmental impacts—without risking too much of the "stilted (and ... moralistic) discussion" (p. 14) the author seeks to avoid. Hence, more examples of the sometimes-irreconcilable notions of profit and corporate social and environmental responsibility would have added greater credibility, as many of the companies profiled have had to make such trade-offs in practice. Overall, however, the book should prove to be a helpful guide for managers tasked with implementing strategies to embed consideration of social and environmental impacts in large organizations. In an academic environment, it could also usefully be integrated into business strategy and social and environmental accounting courses.

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PETER WALTON (editor), *The Routledge Companion to Fair Value and Financial Reporting* (London, U.K.: Routledge/Taylor & Francis Group, 2007, ISBN 13: 978-0-415-42356-4, pp. xviii, 404).

Few other topics have been the subject of as much writing, definition, and discussion over the last decade as Fair Value (FV). Perhaps only in the case of the "chimera" of accountability have a similar number of contributions fueled such a constantly evolving debate.

FV has been discussed by eminent academics, professional accountants, and expert auditors, as well as by representatives of national standard setters and international regulators. Conferences, meetings, and workshops have been dedicated to the topic, and numerous books and articles on it have been published, both locally and worldwide. FV has been regarded with hope, skepticism, and open hostility. Debates have focused on both theoretical profiles and precise analyses, sometimes conducted at levels of extreme technicality.

In any case, none of these attempts have to date resulted in an appropriate summary or definitive solution. So far, no one has put together a "compendium" capable of representing a debate that by its very definition cannot have a perfect and absolute solution. The assignment of value in the preparation of financial statements is an issue upon which hosts of accounting scholars have debated and continue to debate at both national and international levels.

Why then should we single out and highlight yet another book published on the topic of FV? Why should this book become the Companion to help guide debate on FV and Financial Reporting? What global contribution can we recognize in the studies proposed in this volume, edited by Peter Walton? What common thread ties together the 26 essays that compose this book?

The year of publication itself, 2007, may constitute a not insignificant problem in approaching the Companion to Fair Value and Financial Reporting. In the eyes of readers and scholars, 2007 may seem too distant from the period of global economic recession that began in 2008. The virulent manifestation of this recession (the effective extent and gravity of which has yet to be fully understood) may cast more than a little doubt on the validity of reflections made prior to 2008. While writing this review, I have thought several times about starting again from scratch, in order to take into consideration the violent reactions that some regulators seem to have had toward FV.

Although greatly debated, the transition to FV valuation within the European Union seemed to be nearing a successful completion of the experimental phase. However, the EU was then hit by the first consequences of the recent financial crisis, and it experienced a period of extreme financial instrument volatility. The crisis prompted many commentators to reiterate reasons and take critical stances they had proposed years previously, and they adopted tones almost amounting to satisfaction as they witnessed their fears, concerns, and risks coming true. In some regulated industries, the supervisory bodies proposed a return to cost valuations, and this has all been popularly interpreted as a step toward abandoning FV.[2]

What, therefore, can a volume on FV and Financial Reporting convey of interest if it was compiled and published prior to the economic earthquake of 2008?

Reading the contributions that compose this volume edited by Peter Walton and the reflections they have prompted, one appreciates the depth of a book that, in some cases, has gone into such detail as to have succeeded in reaching beyond the scope of the current situation.

The general notion of FV, which this volume contributes to validating, is that the concept is far from having been definitively and exhaustively identified. In the five essays of the Introduction (Section I), and overall in the essays of the other two sections of the book (Section II: Theoretical analysis, and Section III: Fair value in practice), FV is subjected to theoretical and practical analysis from a variety of viewpoints. Together, these different perspectives of inquiry provide the reader with a global picture of unquestionable intellectual and practical value. Individually, the authors have looked at FV from a historical viewpoint, in terms of critical analysis, comparatively (in relation to the situation in the U.S., Australia, Canada, or Japan), from the point of view of specific sectors (such as the banking industry), and with reference to particular activities (such as auditing).

The collection of contributions provided in the Companion is varied enough to provide the reader with a comprehensive picture of FV, the multifaceted nature of the concept, and the complexity of the consequences flowing from its use.

Nonetheless, these different viewpoints on FV do not collectively manage to cover the entire spectrum of possibilities. For example, there is no reference to the specific European context, if indeed it is possible to consider as a unit the diverse accounting traditions of the countries that constitute the European cultural mosaic. The array of essays that the book offers certainly lacks explicit references to the rich German, French, Italian, Spanish, or Dutch tradition of FV studies.

However, the book's strong point is undoubtedly the fact that it provides the reader with a wide range of perspectives on FV, as well as the decision to avoid any preconceived views on an issue that it is still undecided from both theoretical and practical points of view.

From the introductory essays onward, an effort has been made to clear the field of the confusion and the flawed interpretations that have surrounded the vexed subject of FV. In this sense, we may recall the historical references made by Peter Walton when he clarifies that the term FV "has been in use for over a century in the US meaning the value for which an asset could be exchanged between a willing buyer and willing seller, with knowledge of the market and without compulsion" (p. 4). Similarly, Walton highlights that market value has been widely used in continental Europe, especially in France ("market value has a long history in French accounting and was widely used in balance sheets in the nineteenth century" [p. 5]).

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[2] In Italy in 2008, the excessive volatility that characterized the values of financial instruments made it extremely difficult to draw up financial statements containing reliable information. Especially in the case of bank balance sheets, this forced Italy's Central Bank to suspend the use of FV while their financial statements for 2008 were being drawn up, instead going back to cost valuation.

In this part of the volume, it may have been appropriate to mention that accounting scholars in other continental European countries had already studied the advantages and disadvantages of market value valuations in comparison to historical cost valuations during the 60s and 70s. They also highlighted the volatility of market valuations in conditions of uncertainty and economic turbulence. The conclusions reached by David Cairns in his chapter appear to be even more clear and precise, especially when he points out that: "it is not true to say that IFRS require that all assets and liabilities should be measured at fair value. It is also far from true to say that IFRS require all financial assets and financial liabilities to be measured at fair value. The reality is that the use of fair values in IFRS for the subsequent measurement of assets and liabilities is very limited—both in theory and in practice. It is true to say that IFRS are placing much more emphasis on the use of fair values to record transactions and to allocate the initial amount of transactions among its constituent parts. This process began almost twenty-five years ago and reflects the practice in many national standards" (p. 23).

Apart from aiming to clarify erroneous information on the topic of FV, the essays in this book seem to agree and reiterate several times over that the concept of FV still lacks a definitive meaning. In this context, Michael Bromwich's comments are enlightening, as he states that: "the one main impression that no authoritative and detailed analytical case has been provided for the use of fair values. ... A second major impression is that the fair value concept arrived relatively fully formed—originally—as a definition of fair value in an accounting standard without any attempt to defend this definition. ... this and later definitions are fairly bland and seem relatively innocuous, but in fact revolutionize accounting, accounting measurement and income determination when taken together with their necessary operating assumptions" (p. 64). Geoffrey Whittington's contribution is based on similar reflections, as he claims "This lack of uniformity and stability in the definition and application of fair value makes it difficult to define alternatives to fair value without first examining the concept itself" (p. 181).

The essays also make various references to the weaknesses of FV. The events that characterized capital market trends in 2008 forced scholars to focus their attention on the attributes that markets should have in order for fair value to be recognized. On this point Michael Bromwich explains that "... the character of markets, in terms of how well they operate, is fundamental to what results may be expected from using fair values in different situations. Standards-setters have not, as far as is known, empirically investigated the characteristics of markets. Rather, they have merely listed a number of assumptions that are tantamount to assuming well-organized markets" (p. 64). The same author later specifies quite emphatically: "One major problem is to deal with fair value valuations in situations where markets do not exist. The standards-setters' approach is to impose an imaginary market" (p. 66).

Regarding the determination of fair value in very unstable capital markets, the contribution of George Benston is of particular interest. In his chapter, he has provided a reading of the Enron case from an accounting perspective, concluding that "The Enron experience should give the FASB, IASB, and others who would permit (indeed mandate) level 3 fair value accounting, wherein the numbers are not well grounded in relevant market prices, reason to be cautious. Once Enron was permitted to use fair values for energy contracts it extended revaluations to a wide and increasing range of assets, ... The result was overstatement of revenue and net income and structuring transactions to present cash flows from operations rather than from financing" (p. 245).

These reflections have led to a series of consequences that affect the effective use of IFRS in drawing up financial reports and that cause significant problems of interpretation for the preparers and users of the standards. Whole groups of preparers and users are exposed to such uncertainties of application and interpretation, as is clear also in the case of auditors: "fair value is based on concepts for which judgement is central and there is significant volatility depending on the assumptions made, especially when the assets are not quoted on an active market. In such conditions, the auditor, aware of the uncertainties and the factors of volatility, must be able to put the company's choices in perspective" (Jacquemard, p. 299).

The Companion to FV and Financial Reporting therefore has the advantage of presenting such a vast subject from a series of viewpoints that, collectively, help the reader to better understand its complexity, potentials, and problems, as well as the evolution that is constantly with us. In this sense, the editor's decision not to propose any concluding remarks is particularly significant. The idea of providing a collection of essays rather than a textbook or handbook on FV probably made the decision to avoid writing a conclusion easy. Such a conclusion would inevitably have made it necessary to express a judgment on FV, which would not have been in keeping with the variety of perspectives offered by the editor and authors, nor the nature of an ongoing debate that is still far from being at an end.

As mentioned above, the debate on FV is certainly still evolving and, above all, it is unlikely to be resolved definitively. In this sense, it would be legitimate to expect (and one would hope for) the publication of a new edition of the Companion to FV. Some theoretical and practical viewpoints on the subject are still lacking, and the evolution of the situation seems to suggest new perspectives on the horizon. For example, it would be particularly useful to assess the impact of capital market turbulence on FV valuations. Moreover, it might be interesting to understand whether there is a relationship between the features and models of corporate governance and the use of FV valuations. The project of merging the conceptual frameworks of IASB and FASB would be worthy of

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Erratum

The publisher, American Accounting Association, regrets an error in "Do Managers Time Securitization Transactions to Obtain Accounting Benefits?" by Patricia M. Dechow and Catherine Shakespeare in the January 2009 (Volume 84, No. 1) issue of *The Accounting Review*. Figure 6 of that article was inadvertently generated in a manner that displayed the statistics in a format different from that in the page proofs approved by the authors. As presented in the article, the statistics (percentages) were difficult to read. The correct Figure 6 appears below.

FIGURE 6
Financial Statement Impact of Switching from the Sales Treatment for Securitizations to Collateralized Borrowing for Firms with Adequate Disclosures in Their Annual Reports (means are calculated winsorizing extreme observations to 100%)

Panel A: Percent Change in Assets for 172 Observations (Mean Change 39.3% and Median Change 17.4%)

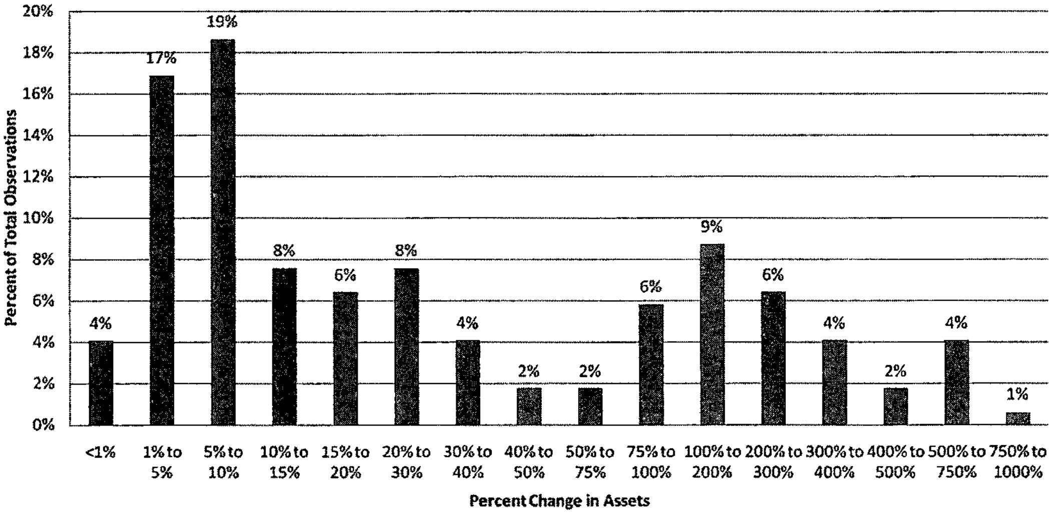

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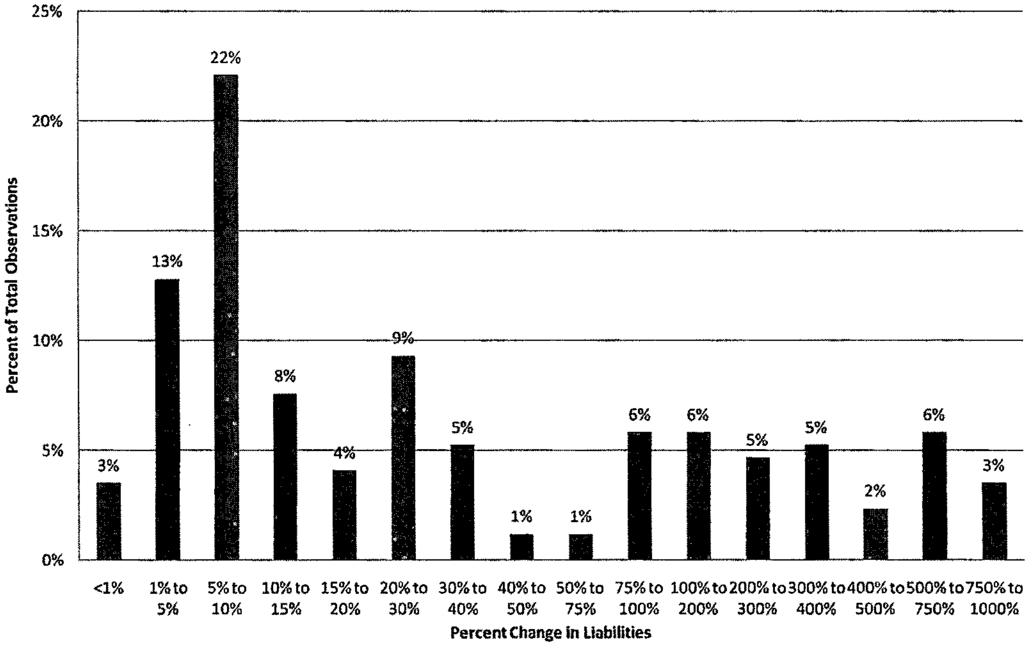
FIGURE 6 (continued)

Panel B: Percent Change in Liabilities for 172 Observations (Mean Change 41.5% and Median Change 20.2%)



Panel C: Percent Change in Debt to Equity for 172 Observations (Mean Change 41.5% and Median Change 20.2%)

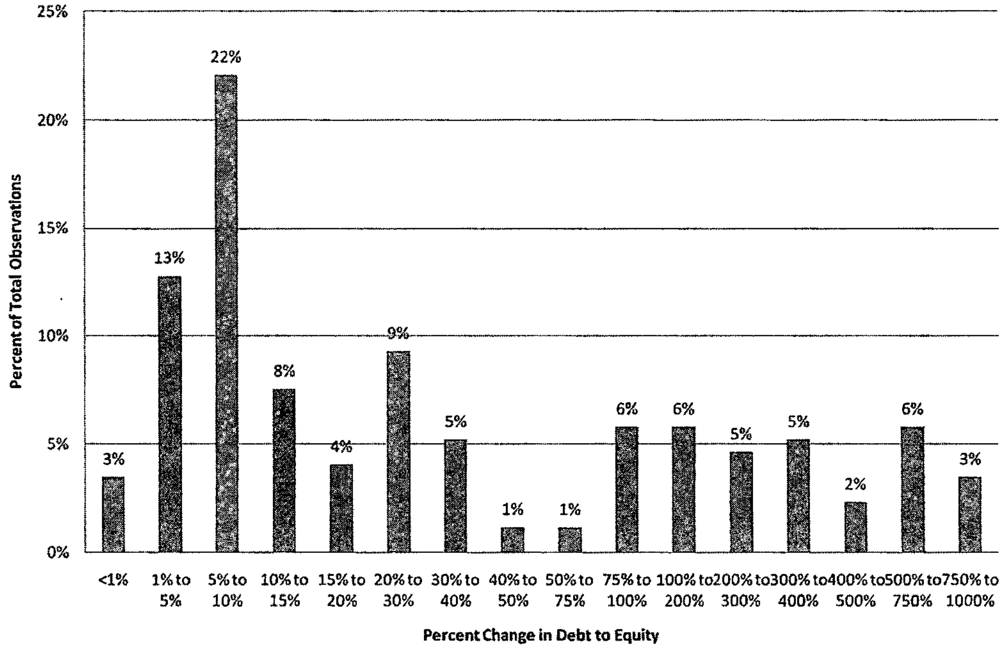


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FIGURE 6 (continued)

Percent change in Assets is measured as [Reported Assets − (Reported Assets plus Securitized Assets less Retained Interest)] deflated by Reported Assets. Percent change in Liabilities is measured as [Reported Liabilities − (Reported Liabilities plus Securitized Assets less retained interest)] deflated by Reported Liabilities. Percent Change in Debt to Equity is measured as (adjusted Debt to Equity) deflated by (reported Debt to Equity) where Adjusted Debt is (Liabilities plus Securitized Assets less retained interest) and Adjusted Equity is (Equity less Gains from Securitizations). Percent change in Cash Flow from Financing is measured as Cash Flow from Financing plus Proceeds from Securitization deflated by Cash Flow from Financing. Percent change in Net Income is measured as Gains from Securitization deflated by presecuritization earnings.

EDITORIAL POLICY AND STYLE INFORMATION

EDITORIAL POLICY

According to the policies set by the Publications Committee (which were endorsed by the Executive Committee and were published in the *Accounting Education News*, June 1987), *The Accounting Review* "should be viewed as the premier journal for publishing articles reporting the results of accounting research and explaining and illustrating related research methodology. The scope of acceptable articles should embrace any research methodology and any accounting-related subject, as long as the articles meet the standards established for publication in the journal ... No special sections should be necessary. The primary, but not exclusive, audience should be—as it is now—academicians, graduate students, and others interested in accounting research."

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The efficiency and effectiveness of the editorial review process is critically dependent upon the actions of both authors submitting papers and the reviewers. Authors accept the responsibility of preparing research papers at a level suitable for evaluation by independent reviewers. Such preparation, therefore, should include subjecting the manuscript to critique by colleagues and others and revising it accordingly prior to submission. The review process is not to be used as a means of obtaining feedback at early stages of developing the research.

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Securities and Exchange Commission (SEC). 2002. *Certification of Disclosure in Companies' Quarterly and Annual Reports.* Release Nos. 33-8124, 34-46427. Washington, D.C.: SEC.

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MAY 2009 PLACEMENT ADS

The deadline for free position ads to be included in this section is two months prior to the date of publication. *The Accounting Review* is published in January, March, May, July, September, and November. Position ads in the "Placement Ads" are free with the purchase of a job posting in the AAA Career Center. For more information on how to purchase a job posting in the Career Center and receive your free position ad in *The Accounting Review*, go to the AAA website at http://aaahq.org and click on "Career Center," or call our office at 941-921-7747.

301 McGILL UNIVERSITY, Desautels Faculty of Management invites applications for tenure track positions in accounting at the Associate Professor/Full Professor level. Preferred candidates should have a proven record for quality research and teaching. We offer a highly supportive research environment and easy interaction with faculty in other disciplines. Located in downtown Montreal, McGill University is one of Canada's leading research universities and is well known for its academic excellence. Salaries and benefits are competitive. Applicants should send their *curriculum vitae*, letter(s) of references and recent publications/working papers to: Ms. Kate Maguire, Administrative Assistant, Accounting Area, Desautels Faculty of Management, McGill University, 1001 Sherbrooke St. West, Montreal, Quebec, Canada, H3A 1G5. In accordance with Canadian Immigration requirements, priority considerations will be given to Canadian citizens or permanent residents but all qualified candidates are encouraged to apply. McGill is strongly committed to diversity in employment and welcomes applications from visible minority group members, women, members of sexual minority groups, and persons with disabilities.

302 OUR LADY OF THE LAKE UNIVERSITY (OLLU), a Hispanic-Serving Institution (HSI) in San Antonio, TX invites applicants for a full-time, tenure-track appointment in Accounting beginning fall of 2009. Candidates should have (or be near completion of) a doctorate in accounting, while those with a Master's degree in accounting, a CPA certificate, and college teaching experience will still be considered. Salary will be competitive and commensurate with experience. Please send a completed Application for Academic Employment, letter of interest that addresses the requirements of the position, current resume/*vita*, and three references that can validate academic experience to: OLLU, Human Resources, 411 S.W. 24th Street, San Antonio, TX 78207-4689; Fax: (210) 434-4073. For a faculty application form, please click http://www.ollusa.edu/s/346/images/editor_documents/OLLU_Academic_Employment.pdf. For questions about positions contact: Human Resources Office, ext. 3970; or Email: hrteam@lake.ollusa.edu. OLLU is a Catholic University, is an Affirmative Action/Equal Opportunity Employer, and is committed to diversity within its community.

303 SUSQUEHANNA UNIVERSITY, Sigmund Weis School of Business seeks candidates at the Assistant or Associate Professor rank for a tenure-track position in Financial Accounting starting fall 2009. Candidates should possess an earned doctorate in Accounting; ABDs with strong potential considered. Professional certification desirable. The Sigmund Weis School of Business, accredited by AACSB-International, focuses exclusively on undergraduate education: 22 faculty members serve 575 majors. Susquehanna, a selective, residential, liberal arts institution with 2,100 students, is located 50 miles north of Harrisburg and about three hours from Philadelphia, Washington, and New York City. Please submit letter of interest, *curriculum vita*, unofficial transcripts, and the names, telephone numbers, and email addresses of three professional references to Dr. Barbara McElroy at: mcelroyb@susqu.edu, or mail to: Sigmund Weis School of Business, Susquehanna University, 514 University Avenue, Selinsgrove, PA 17870. For additional information see: http://www.susqu.edu/human_resources/Employment/AsstProfAcct_2-09.html. AA/EOE. Applications from women and minorities are encouraged.

304 EASTERN MICHIGAN UNIVERSITY seeks applicants for two tenure-track Assistant and/or Associate Professor positions to begin fall of 2009. Primary interest in Managerial Accounting, Financial Accounting, or Auditing would be preferred. A Ph.D. with a major in Accounting from an AACSB-accredited school or its equivalent is required; however, an ABD with substantial evidence of completion will be considered. CPA or other professional certifications is desired. Business experience is a plus. Salary is competitive. EMU is a public, comprehensive university of nearly 23,000 students in southeastern Michigan and the College of Business is AACSB-accredited. Submit letter, *curriculum vita,* and contact information for three references electronically to: academic_hr@emich.edu. Please reference Posting #F0912 in the subject line and send attachments only. Do not type in the body of the email. Review of applications will start immediately and continue until the positions are filled. For more information, contact the Search Committee Chair at: howard.bunsis@emich.edu.

305 PURDUE UNIVERSITY CALUMET (PUC) invites applications for a tenure-track Associate/Full Professor of Accounting position effective August 2009. Doctoral degree in discipline is required. Responsibilities include teaching undergraduate and graduate courses in Auditing, Fraud Accounting, and other advanced accounting topics, scholarly research leading to refereed publications, and service to the profession, the university, and the community. The School of Management offers a Master of Accountancy, the M.B.A., and Baccalaureate degrees. Purdue University Calumet is located in Hammond, IN, 25 miles southeast of downtown Chicago. PUC provides a superb benefits package. Interested applicants should submit letter of application and *vita* with references to: Ms. Lestra Cole, Accounting Search Committee, School of Management, Purdue University Calumet, 2200 169th Street, Hammond, IN 46323. Electronic submissions are encouraged; send to: llcole@calumet.purdue.edu. We will be interviewing at the AAA meeting in New York in August unless the position has already been filled.

306 JOHNS HOPKINS UNIVERSITY, Carey Business School invites nominations and applications from faculty who are motivated by the unique opportunity to build a world-class business school. Openings are currently available in Accounting, Finance, Marketing, and Strategic Management. Each candidate must possess a doctoral degree from an accredited university, a strong record of academic research, and excellent teaching skills. Senior Assistant, Associate, and Full Professors will be considered. For full consideration, candidates must apply electronically by submitting a cover letter outlining area of interest, *curriculum vitae,* and the names, addresses, and phone numbers of three references to: Dr. Phillip Phan, c/o John J. Kunz, Director of Human Resources. Documents should be in Word or PDF format and emailed to: carey.school-hr@jhu.edu. Review of candidates has commenced. Positions will remain open until filled. Johns Hopkins is an Equal Opportunity/Affirmative Action Employer. Minorities and women are strongly encouraged to apply.

307 NEW JERSEY INSTITUTE OF TECHNOLOGY, School of Management invites applications for a tenure-track Assistant Professor position in Accounting beginning fall of 2009. The position will remain open until filled. The School of Management is AACSB-accredited. Applicants should possess a doctorate degree in accounting (ABD if close to completion) and should have a strong commitment to excellence in teaching, research, and service. The candidate will be expected to teach undergraduate and graduate accounting courses particularly in areas of Auditing and/or Taxation and participate in curricula development. To apply, go to: http://njit.jobs and search using posting #0600384. Include *curriculum vitae*, three letters of reference, teaching evaluations, and samples of research publications (if any). If you have questions, please contact Dr. Wei Xu at: xwrachel@adm.njit.edu. NJIT is located in close proximity to New York City and is an Equal Opportunity Employer that encourages applications from women and minorities.

308 SAN DIEGO STATE UNIVERSITY (SDSU), Charles W. Lamden School of Accountancy invites applications for tenure-track positions in Accounting Information Systems, Audit, Managerial, Financial, Tax, or International Accounting at the Assistant/Associate/Professor level for 2009–2010. Applicants should complete Ph.D. or D.B.A. by August 2009. Preference given to candidates with a multi-disciplinary and integrative approach to accounting. Professional certification and experience are desirable. These positions are contingent upon State funding. More detailed descriptions are available at http://www.sdsu.edu/accounting. If interested, send *vita*, three recommendation letters, and evidence of teaching effectiveness and scholarly contributions to: Sharon Lightner, Director, Charles W. Lamden School of Accountancy, SDSU, San Diego, CA 92182-8221; Phone: 619-594-3735; Email: sharon.lightner@sdsu.edu. SDSU is an Equal Opportunity Employer and does not discriminate against persons on the basis of race, religion, national origin, sexual orientation, gender, gender identity, and expression, marital status, age, disability, pregnancy, medical condition, or covered veteran status.

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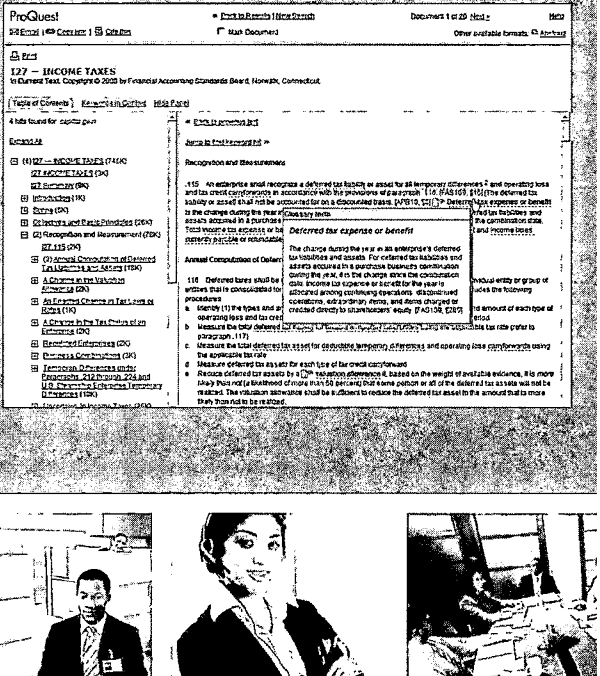
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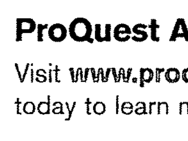
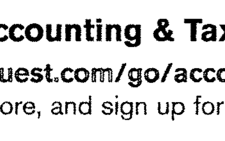
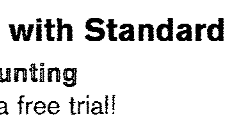

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